

**Raising the Memory of Nature:  
Animals, Nonidentity and Enlightenment Thought**

by  
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and not even in this mundane factual letter  
do I want to omit sending you greetings  
from the Pampered Creature.

Please write soon!

Adorno to Benjamin, Frankfurt, 13 April 1934  
(translation by Nicholas Walker, modified)

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## Abstract

Society's current experience of nature is ambiguous. Just as nature proves severely affected by human activities and vulnerable, it also appears threatening to us. Although the changes in nature have been perceived for long as an ecological crisis, this experience and the challenges it provides have remained persistently exigent over the last four decades. As a consequence, our epistemological understanding of nature and culture as separate entities has been inherently shaken. My study is located among ecocritical attempts to negotiate these experiences. Immanent critiques of E. O. Wilson's and Bruno Latour's epistemologies exemplify how we cannot escape the dualism in society's relationship to nature by simply declaring nature's and culture's unity. Relying on the social philosophy of Max Horkheimer and Theodor W. Adorno, I instead consider the dualism as historically both true and false, and argue that instrumental reason provides a socio-psychological barrier to transcending the way Western society relates to nature. Central to the situation's perpetuation is the confidence that the object of knowledge can be adequately and steadily identified in knowledge. Based on Adorno's negative dialectics, I develop a model of cognition that works through the dualism within the knowing subject and in its relation to animals. This model is substantiated in the context of Enlightenment thought. A reconstruction of the development of René Descartes' (1596–1650) epistemology in relation to his philosophy of nature and the place of animals within it shows the animal as particularly resistant to Descartes' conceptual identification. In the writings on animal behaviour of Hermann Samuel Reimarus (1694–1768) this resistance further manifests as a self-mediation of animals, which denotes the limits to their conceptual assimilation. Maria Sibylla Merian's (1647–1717) aesthetically mediated insect studies capture this tension between species commonalities and unique particularities, and represent the single specimens as nonidentical individuals. Through critical engagement with these works, my study develops a cognitive approach to nature that preserves its object as qualitatively mediated between universal and particular properties, and inherently nonidentical. Simultaneously, it recovers the animal as an object of knowledge particularly resistant to identificatory thought. Consolidating these two insights, aesthetic mediation of animals provides an experience that reveals to the subject its limited power over the objects and which is capable of raising the memory of nature within the subject.

*the trees are stacked in rows on the side of the road  
stripped of any dignity a birthing may have had  
100 thousand crucified on the Mojave I-5 line*

Rocky Votolato. 2006. Uppers aren't necessary.

## Introduction

This thesis receives its motivation from my discontent with humans' treatment of nature and animals, and a frustration about the ineffectiveness of the environmental debates of the last forty years. Against this backdrop, my study pursues the possibility of reconciliation between humans and nature under the conditions of our current historical situation. It is beyond doubt that the organisation of social relations, including those between humans and nature, according to capitalist principles constitutes the mainspring for the exponential degradation and undermining of the ecological conditions of existence for both human and non-human organisms. Deeply influenced by the philosophy of the Frankfurt School and in particular Theodor W. Adorno, I am, however, just as much without doubt that the solidification of reason to an instrument for the domination of nature, alongside the fear of what might become if humans were to declare their solidarity honestly with oppressed nature and surrender their claims to power and superiority, are primary hindrances to the transformation and reconciliation of the relationships concerned (Horkheimer and Adorno 2002; Horkheimer 2004). Seeking to soften the induration of social relations and the domination of nature, Adorno (1973a, xix–xx, translation modified) pursued throughout his life a critique of cognition<sup>1</sup> that endeavoured “to use the strength of

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<sup>1</sup> In German, Adorno relied on the term *Erkenntniskritik* or *Erkenntnis*, which translates into a variety of English terms such as knowledge, recognition, realisation, insight, discovery, perception, and cognition. Yet, especially within Adorno's philosophy the concept of *Erkenntnis* receives its philosophical rigour precisely because it combines all these references, while each of the available options of translation confine such rigour by singling out a specific meaning of the term. 'Erkenntnis' extends to the ability of perceiving and comprehending the world, the mental processing of perception and experience and the insights reached through such mental processing. While Anglophone philosophical discourses have used the term cognition usually in such a broad sense, it has received a significantly more

the subject to break through the fallacy of constitutive subjectivity,” by crossing “the frozen waste of abstraction to arrive concisely at concrete philosophizing,” as Walter Benjamin once had remarked during a personal conversation, Adorno remembers. Adorno’s book *Negative Dialectics* “charts such a crossing” and “seeks no less to serve authentic concretion than to explain the author’s concrete procedures” (ibid., xix). As such, the text “attempts by means of logical consistency to substitute for the unity principle, and for the paramountcy of the supraordinated concept, the idea of what would be outside the sway of such unity” (ibid., xx). According to Adorno’s (2005a, translation modified) dictum: “critique of society is critique of cognition, and vice versa,” the question of social emancipation becomes one of confronting the knowing subject with its own limitations in comprehending the object of knowledge by laying open in the object what is beyond the subject’s grasp. By thus breaking through the reproduction of instrumental reason as false consciousness, the process ultimately hindering emancipation, a transformation of social reality might become possible (Adorno 1997, 243).

Drawing on this philosophical background, my text is located within the current context of societally and ecologically motivated criticism of science. Against the dominant trends in contemporary ecocritical thinking, however, I am neither renouncing the dualism of a distinguished social sphere on the one hand and nature on the other. Nor do I pursue the mediation of our ecological morass by searching for post- or non-dualistic forms of knowledge (approaches exemplified, for example, in

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positivist-scientific tone that reduces it to the measurability of computational processes pertaining to the transfer of information with the advance of cognitive- and neurosciences. It thus seems appropriate to point out within an interdisciplinary cultural studies context that I am applying the term ‘cognition’ as an equivalent to ‘*Erkenntnis*,’ and hence in its broader, philosophical sense.

the work of Bruno Latour and Donna Haraway). Instead, relying on Adorno's writings, I consider dualistic thinking and the dualism of culture and nature historically to be both true and false and propose working through these two terms dialectically while also relying on them. In this respect,

dialectics unfolds the difference, dictated by the universal, between the particular and the universal. While dialectics, which designates the sinking in of the break between subject and object, proves inescapable to the subject, furrowing everything the subject reflects on at the objectual, dialectics would have an end in reconciliation.<sup>2</sup> (Adorno 1990a, 18)

Taking up additionally Adorno and Horkheimer's (2002, 212) verdict that "what threatens the prevailing praxis and its inescapable alternatives is ... the remembrance of nature," I hypothesise that our current historical conditions impart to the human-animal relationship a distinctive role in the necessary process by which the knowing subject might come to face its own immanent limitations in appropriating the objects of knowledge.

My reliance on the writings of the Frankfurt School aligns with recent attempts of reassessing the original critical theory for ecocritical debates.<sup>3</sup> In contributing to these attempts, my own efforts are aimed at criticising and breaking through instrumental reason, which time and again cannot help but reconfirm the urge to dominate nature. Rather than tracing this critique within Adorno's philosophy, however, I endeavour to rely on Adorno's negative dialectics as a model of critique to challenge instrumental reason and the dialectic of enlightenment under current

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<sup>2</sup> „Dialektik entfaltet die vom Allgemeinen diktierte Differenz des Besonderen vom Allgemeinen. Während sie, der ins Bewußtsein gedrungene Bruch von Subjekt und Objekt, dem Subjekt unentrinnbar ist, alles durchfurcht, was es, auf an Objektivem, denkt, hätte sie ein Ende in der Versöhnung.“

<sup>3</sup> For example Böhme and Manzei (2003); Cook (2011); Hullot-Kentor (2006); Nho (2000); Nho (2001); Sanbonmatsu (2011); Winterfeld (2006); Witt-Stahl (2007); Zuidervaart (2007).

historical conditions of false consciousness: following Adorno's lead, my study presents an attempt to confront the anthropocentric subject of Modernity with the fallacy of its constitutive character by unfolding the difference between the particular and universal and thereby charting a passage through 'the frozen waste of abstraction' at the special example of the animal, in hope of steering towards a reconciliation of humans and nature.

The task is two-fold: on the one hand, the particular cognitive effect of the animal on the knowing subject needs to be evinced, while on the other the limitations of the knowing subject's control over the object of knowledge must be demonstrated; both will be pursued by recovering the animal from its anthropocentric adjustment. My treatment of these questions leads through a historical assessment of the scientific determination of the animal at various moments during the European Enlightenment. Although chiefly concerned with questions of epistemology and the philosophy of science in relation to our understanding of nature, this thesis thence also contributes to the study of history of science and ideas, in particular developments pertaining anthropocentrism and the mechanisation of animals.

The first chapter, headed "Prologue," which is strictly speaking not actually part of the formal analysis, sets the stage by explicating some contemporary constellations in the human-nature relationship that reveal contradictions within, impediments to and potentials for moving beyond our current way of engaging with nature, to which the studies that follow correspond. Thereby, the analysis becomes grounded within current social conditions. My second chapter, "Knowing Nature," develops a negative dialectical approach to the study of nature as well as a theory of human-nature reconciliation, which considers the comprehension of the object of

knowledge within tension to the knowing subject and society's appropriation of nature, through an immanent critique of E.O. Wilson's and Bruno Latour's epistemological approaches to nature research they suggest as responses to the current crisis in human-nature relationships. Although in this chapter I work most explicitly with the negative dialectical elements of Adorno's philosophy, as opposed to aesthetic ones, it must be acknowledged that the former cannot be fathomed without the latter. *Negative Dialectics* and *Aesthetic Theory* are hence read in tension with one another.

In a way that is modelled after Adorno's philosophising, which refuses to develop or adhere to a coherent method (Adorno 1982, 1) – nowadays more than ever the mainstay for all intellectual endeavours – the historical examination that follows approaches its task through an immanent critique of the works discussed. Although thereby putting the cart before the horse, the studies provide empirical support for Adorno's critique of epistemology and hence his approach to cognition as much as they claim to undo the knowing subject of science from the inside. Chapters three to five proceed to examine the study of animals at three different moments during the European Enlightenment through the works of René Descartes (1596–1650), Hermann Samuel Reimarus (1694–1768) and Maria Sibylla Merian (1647–1717). This selection allows my study to question the possibility of comprehending the animal in three different realms: the epistemological paradigm of Modern science at the time of its emergence, the conceptualisation of animal behaviour in contrast to its empirical appearance, and the representation of animals through aesthetic mediation. Thus, on the one hand both conceptual claims as well as epistemic procedures are measured against the ambiguity of the object to which they refer;



while on the other, my immanent scrutinising of the mediation of the object recovers and retains this ambiguity. At the same time, the examination recovers aesthetics as an adequate approach to the study of nature. The conclusion reconnects the historical studies to the social critique of Adorno.

Working with source material not originally composed in English and from different historical periods means that both accessibility and translation have offered a challenge. Moreover, engagement with such comprehensive, controversial and intellectually weighty oeuvres as Adorno's and Descartes' means facing a thicket of contradictory interpretations, critiques and opinions. To clearly make visible and ground my argument within these works, I have decided to rely more heavily on original quotes than might usually be common in a study of this kind. This has been necessary for reasons of plausibility and transparency, as well as to do justice to the efforts of the authors. At the same time, of course, my interpretation does not claim to be exhaustive. All translations from German are my own, if not stated otherwise.

Adorno's translators repeatedly highlight the ardent and ultimately impossible task of translating his philosophy and idiom (cf. Hullot-Kentor 1997; Weber 1997; Zuidervaat 1991, 45–7). This is particularly problematic for relying, from a non-German context, on a thinker who saw the content of his work inseparably intertwined with the form (and therefore language) in which it was presented (Sonnemann 1987, 226). While the quality of English translations has improved significantly in recent years, for some of Adorno's works, adequate English versions are still unavailable. Where it has been necessary to reveal the particular spirit in which I am invoking Adorno's writings, I have hence either adjusted the available translations or carried out my own, additionally providing the German sources within

footnotes in cases where the English passages might gain clarity by comparing them to the German originals. As a consequence, referencing changes frequently between German originals and English translations of Adorno's works. For reasons of transparency and accuracy this proves unavoidable.

I have had to accept a similar awkwardness in dealing with Descartes' writings. Having no sufficient command of either French or Latin, I have relied on both English and German translations of Descartes' works. While the three-volume edition *The Philosophical Writings of Descartes* by Cottingham, Stoothoff, Murdoch and Kenny (1984–91) provides the most comprehensive collection of Descartes' works in English, it is nevertheless far from complete and translates only sections of some of Descartes' major works, which are unavailable elsewhere in this language. As a consequence, I rely on alternative translations where possible. Especially in the case of Descartes' early works I complement the selection from the aforementioned edition with the recent new German translations by Christian Wohlers.

The task proves simpler with the works of Hermann S. Reimarus and Maria S. Merian, which have not been translated yet. Accordingly, I rely on my own translations except in very few instances, for example Merian's letters, which were translated as part of an exhibition catalogue (Merian 1998, *Letters* [1682–1712]). Any such instances have been marked in the text. Here too, the German sources of my English translations are provided within footnotes, even though they crowd the pages in places, again in order to give German-speaking readers the opportunity to assess my argument within the context of the original sources. Due to the numerous editions of both Reimarus' and Merian's works it seems furthermore advisable to explicate the editions that provide the basis for my reading of their works.

Reimarus frequently revised and extended his books between the various editions that appeared during his lifetime, and the *General Considerations on the Drives of Animals* (1760/62), the main focus of my analysis of Reimarus' theory of animal behaviour, was further extended after Reimarus' death by his son with material from his father's notebooks. The collected works, collated by the Joachim Jungius-Society of the Sciences and the Lessing-Academy Wolfenbüttel between 1972 and 1985, reproduce Reimarus' books and compare the different text editions generated by him, providing reliable and comprehensive access to his texts. These were complemented by my consultation of Reimarus' estate at the Staatsarchiv Hamburg, Germany.

In Merian's case, the situation is less straightforward. Her books and extracts have been reproduced innumerable times, and even with the original copies, which were printed under Merian's supervision both in colour and in black and white, the authenticity is difficult to establish because of the potential that they have been coloured subsequently to their printing by Merian, to say nothing of the substantial differences in the quality of later reprints (Reitsma 2008, 166–7). For my assessment, I hence rely on various facsimile print versions which I complement with digitalised original copies. Sources for text and images differ. Merian's early collection of flower paintings (1675-80) are available as scans of a version coloured by Merian held at the Saxon State and University Library Dresden and a facsimile version reproduced from the same copy. This also includes the work's preface in German. The collection on European insects (1679 and 1683), has not been properly reproduced yet, but parts one and two are available as digital scans including German texts from the University Library Heidelberg, while the third volume published posthumously by Merian's

daughter as part of the collection *Erucarum Ortus, Alimentum et Paradoxa Metamorphosis* (*The Caterpillars' Growth, Food and Paradoxes of Metamorphosis*, 1717) is provided digitally by Bamberg State Library, although only with Latin text. Merian's magnum opus *Metamorphosis Insectorum Surinamensium* (*Metamorphosis of Surinamese Insects*, 1705), which was originally published in Latin and Dutch, is available to me as facsimile of its second edition from 1719, enlarged by twelve additional plates, in Dutch. Additionally, this version is complemented by a scan of a coloured Dutch first edition, with a total of sixty plates, from Göttingen State and University Library. The texts for Merian's work are available in a German facsimile of the first edition, translated from Dutch by Gerhardt Worgt. Finally, Merian's studybook, which she kept in German, is available as a recent facsimile.

The thesis' formatting follows the guidelines of the Chicago author-date system of referencing. In the chapter on Descartes it seemed helpful also to have the works' titles and times of origin readily available, rather than just the dates of publication of the used editions, to be better able to follow the chronological reconstruction of the development of Descartes' thinking. To reflect this, Chicago's in-text citation format has been updated to include the works' short titles and original dates of publication or composition between author and publication dates of the editions actually used. For reasons of coherence, this custom is retained for Reimarus' and Merian's publications as well. Historical and lesser-known persons central to my examination are marked by their dates of birth and death. For better readability, personalities well known and mentioned only in passing, such as Hegel and Kant, as well as personalities from the twentieth century are mentioned without dates and in their customary way. All Figures are reproduced from the referenced sources and original,

digitalised copies. Material covered in Chapter One, “Knowing Nature,” and Chapter Four, “Merian and the Aesthetics of Insects,” has been published previously under the title “Anthropocentrism and Reason in *Dialectic of Enlightenment*: Environmental Crisis and Animal Subject” in the collection *Anthropocentrism: Human, Animals, Environment*, edited by Rob Boddice and published in 2011 in Leiden and Boston by Brill (321–40), and in 2013 as “Metamorphosen des Subjekts. Naturerkenntnis in und jenseits von Maria Sibylla Merians (1647–1717) Surinam-Buch” in the issue *Metamorphosen* of the journal *Tierstudien* (04/2013, 77–88).

## 1. Prologue: Human–Nature Constellations

In 1972, a *United Nations Conference on the Human Environment* in Stockholm, Sweden, validated the state of the environment a pressing issue. Forty years later, anthropogenic climate change is referred to as “one of the defining challenges of our century.”<sup>1</sup> Neither having gone unnoticed nor having remained unanswered, the threat of an environmental crisis is commonly acknowledged and has its place in public awareness. Ecological problems have been discussed for decades and approached on various levels by scientific, political, legal and cultural means. A broad and lively discussion about the right strategies to address these problems continues today, and tremendous measures have been undertaken to find solutions. Green technologies are invented at an impressive rate. Yet despite some success stories such as the expected recovery of the ozone layer by the middle of the century (Carpenter et al. 2014, 33–36) and the de-acidification of rain in Europe (Menz and Seip 2004), pollution of natural environments continues, and earth’s capacity to support diverse life promises to diminish more rapidly (cf. Meadows et al. 2004). Stores of natural resources such as fossil fuels (rock oil and gas) are draining. Climate change has the potential to turn earth into a hothouse accompanied by mass extinction (Hannah 2012). Avoidance is already not the issue anymore – instead, the focus has shifted towards limiting the increase in temperature and handling its consequences (Latif 2009; Stern 2007). The latter are of both ecological and social kind. Whole countries are threatened by rising sea levels, which might force island

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<sup>1</sup> Connie Hedegaard, President of the fifteenth *United Nations Climate Change Conference* (COP15) in Copenhagen, was cited with these words by Michael von Bülow in a press release by COP15 in 2009. The webpage since has ceased to exist, but references to the content can be found readily on the Internet.

nations in the South Pacific to migrate to other countries (Burson 2010). On the spectrum's other end, Africa and southern parts of Europe face desertification and a significantly increased risk of forest fires (Khabarov et al. 2014; Rubio et al. 2009). Yet, it is not only such large-scale catastrophes that cause worries. New York City, USA, fears an overload of its power networks from plentiful usage of air-conditioning systems due to long and severe hot spells (Rosenzweig and Solecki 2001). More frequent hurricanes and other events caused by extreme weather conditions are believed to be a result of the changing climate as well and are expected to intensify even more in the future (Latif 2009). Instead of achieving qualitative improvements over forty years of dealing with the problem, then, the threat only appears to have increased (cf. Goudie 2013). Such developments verify the invariable failure of efforts to halt the global eco-system's descent and justify talk of a social-ecological crisis the world faces today. While reconciliation with nature seems more urgent than ever, instead nature's exploitation welters on unchecked.

In stark contrast, Modern, enlightened sciences emerged in the sixteenth and seventeenth century with the aspiration to overcome society's material hardship through the domination and control of nature on the basis of nature's methodological determination. One work that exemplifies this perspective and epitomises the hopes pinned on it probably more than any other is Bacon's (1941) *Nova Atlantis*. Composed in the early seventeenth century, it tells the story of an accidental discovery of a well-hidden island in the South Sea, where the ship's crew finds shelter and recovery in the city of Bensalem. The place appears to the shipmates as "a picture of our salvation in heaven" on earth; the discoverers feel as if they "were come into a land of angels which did appear to us daily, and present us with comforts which we thought not of,

much less expected" (ibid., 9–10). Indeed, Bensalem proves so wonderful that people who have not witnessed it with their own eyes must take reports of it "but for a dream" (ibid., 19). The city's prosperity, as the visitors learn, rests on an institution called Solomon's House, "the noblest foundation," in the eyes of Bensalem's inhabitants, "that ever was upon the earth, and the lanthorn of this kingdom" (ibid., 20). Although the accounts of *Nova Atlantis* are fictitious, Bacon's secretary William Rawley (1588–1667) explains in his short address to the reader that the author "might exhibit therein a model or description of a college, instituted for the interpreting of nature, and the producing of great and marvellous works for the benefit of man, under the name of Solomon's House" (ibid., 1). Some thirty years prior, Bacon (2004, 305) had developed and proposed an organisational model and a method for the systematic production of knowledge, from which "an improvement in man's lot is bound to follow, and an enlargement of his power over nature." Through right use of human intellectual capacities, nature was supposed to be overthrown and put under human control. Whereas humans'

facility to believe, impatience to doubt, temerity to answer, glory to know, doubt to contradict, end to gain, sloth to search, seeking things in words, resting in part of nature; these and the like, have been the things which have forbidden the happy match between the mind of man and the nature of things. ... [Instead,] the sovereignty of man lieth hid in knowledge ... to command [nature] in action. (Bacon 1962, 125–6)

*Nova Atlantis* and the society of Bensalem hence present Bacon's utopian visions of the potential of a society which grounds its proliferation on the methodical study and determination of nature, and thereby promises eventually to re-establish paradisiacal conditions on earth.

There can be little doubt as to the implementation of Bacon's programme today, yet, we are facing a double paradox in respect to his hopes. On the one hand,



the incredible extension in our powers of altering, modifying and adjusting nature to our desires and needs, which with the help of scientific inquiry humans have obtained, has not led to paradisiacal conditions and complete control of nature, but conjured up instead a material threat of undermining the natural conditions of our existence. The more power we gain, it appears, the less control we actually exert. With the ecological situation thus only worsening rather than improving, we prove on the other hand at the same time incapable of overcoming the problem. Rather than solving our material problems once and for all, our advanced dominance over nature unravels into the opposite – unruliness and helplessness. Pavel Kabat, hydrologist and, as one of the lead authors of the Intergovernmental Panel on Climate Change's fourth report on climate change, co-recipient of the 2007 Nobel Peace Prize, stretches this paradox to the absurd. In his mind, rich Western countries should conceive climate change and rising sea-levels as a business opportunity to advance our technological capacity to manage water, whereas he leaves poor countries no alternative but to adapt to the new actualities (Blasberg and Blasberg 2007). Kabat's response expresses the harsh pragmatism of the positivist realist, but his solution proves flawed. Without reflecting on the particular circumstances, his approach advocates domination and commodification of nature as self-evident means for the tackling of the crisis. Not only does he reaffirm the call for nature's rational management at the very moment in which such management, or more poignantly control of nature manifests as ill-founded – he also proves dismissive of the grave consequences for the vast proportion of the global population that lives in coastal areas. That population is set to lose their home, and this also holds true for the island nations who are placed at the West's mercy, either in seeking refuge or indebting

themselves to afford the technology for managing the rise in sea levels. Kabat does not promise to solve the problem, but rather to update it and, wittingly or unwittingly, merely leads the crisis to its economical exploitation at the costs of its most vulnerable victims. Hardly a solution and indeed inadequate to the specific challenge, his pragmatism itself becomes irrational and reveals as ideology. Kabat's suggested solution proves indifferent to the particular experience and needs of the people affected. The means to solve the crisis – scientific-technologically controlled domination of nature and commodification of the crisis – exhibit a life of their own where they are applied regardless of the specific conditions and necessities of the situation. It seems accurate after all that ecological management always proposes extending human manipulation of nature in a “finer, more intimate fashion and with a still more invasive scientific apparatus” (Latour 2004, 20).

Entwining economical and scientific-technological rationale, Kabat's approach to the crisis shows how the unleashing of productive forces driven by capitalism and the demands of capital production manifest as instrumental in the environmental degradation and unprecedented, exponential exploitation of natural resources in Modernity. It appears less clear, however, why people perpetuate this very system when it obviously undermines its own prerequisites of production and runs contrary to their interests at large. Writing the following lines in 1969 against the background of the student revolts, and with the memory of peoples' ready support for totalitarian regimes, not the least in Nazi Germany, Adorno (2005b, 271) argues that “ever since the market economy was ruined and is now patched together from one provisional measure to the next, its laws alone no longer provide sufficient explanation” for the state of society. Without the additional consideration of psychology, “in which the

objective constraints are continually internalized anew, it would be impossible to understand how people passively accept a state of unchanging destructive irrationality” (ibid.). Kabat’s proposal does reflect such irrational automatism not only by upholding the crumbling ideal of managing nature and affirming the current destructive state through turning the catastrophe into a virtue – it also illustrates the continuous internalisation of the logic of capitalism and domination of nature without regard to any particular conditions encountered. By emphasising how the corrupt state of society automatically reproduces and secures within the individuals as false consciousness, which, if it remains unreflected, forms in accordance with the objective conditions they are subjected to, Adorno relegates the possibility of social change to interference with this process of internalisation. Any hope to transform prevailing social conditions becomes a problem of uncovering the irrationality, contradictoriness and untenability of the current condition, through which societal contradictions are falsely reconciled and covered up.

Against the well-worn status quo, however, rises the possibility of transformation. To collect footage on the hatching of emperor penguins for the TV-series *Planet Earth*, a film crew accompanies their protagonists through the Antarctic winter. Discovering a penguin chick trapped under a blanket of ice, Fred Olivier frees the anxious bird and reunites it with its parents while narrator David Attenborough explains that although “natural history film crews do normally not interfere with the course of nature, ... having shared the penguins’ six months struggle for survival it was impossible for Fred to just sit back.” (Fothergill 2010, ch. 6, min. 51:46–51:58, my

transcript)<sup>2</sup> Witnessing the birds' ordeal of incubating their eggs in such a hostile environment and sharing in the experience of Antarctica's hostility led the researcher to sympathise with the plight of the young hatchling against the scientific codex of neutrality and ideal of separated objectivity. Through the shared experience of vulnerability within an environment utterly indifferent to the individual, the chick becomes something more than an exchangeable representative of its species devoid of any specific qualities of its own. But this very act of solidarity betrays simultaneously the programme's ideal of scientific objectivity and accuracy. Attenborough's attempt to extenuate Olivier's action and restore the distance between scientist and object is as futile as it is revealing. Antarctica proves the epitome of natural remoteness, yet coincidentally it is set to vanish alongside its emperors altogether due to human subordination of nature. Insisting on the non-interference of the observer seems almost comically inept in such an area. That the story is incorporated into the programme nonetheless, it yet appears that its makers cannot quite evade the experience's truth either. Rather than confirming Olivier's act as insignificant for the programme's scientific rigour, Attenborough's commentary reveals as a desperate act to save the knowing subject's neutrality and independence from its objects of knowledge against the actual experience of their lived mutuality. Moreover, the example shifts the emphasis from the inescapability of the universal to the differentiation of the particular, which receives primacy over the universal in an attempt to resist the tendency to universal, objective thought, thereby surpassing both Bacon's vision of securing dominion over nature and the simple and automatic pragmatic realism of Kabat. While Kabat passes his fatalistic pragmatism off as

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<sup>2</sup> See <http://www.bbc.co.uk/nature/collections/p00mr6nq#p00mrwbr>, min. 2:57–3:09, accessed 22 December 2014

realistic, it proves utterly inadequate to the particularity of the situation. Olivier's act of benign companionship across species, in all respects perceived as trivial, naive and inappropriate, is what proves amiable to the situation and experience. As such, the Antarctic episode witnesses the very possibility of a human-nature relationship based on solidarity, where technique "under transformed relations of production ... would ... be able to assist nature and on this sad earth help it to attain what perhaps it wants" (Adorno 1997, 68). That a natural history programme foreshadows solidarity within relationship to an animal, provides the cue for my study of exploring the possibilities of human reconciliation with nature.

Moreover, our current experience with nature seriously fractures the internalisation of nature's domination as imperative in the human subject's relationship to nature. Human societies have relied on nature as a source of reproduction and progress that appeared to be inexhaustible. As natural resources become scarce and ecological living conditions poorer, however, this certainty is damaged. Nature becomes increasingly visible not only as a resource for (even when these days considered in the context of its contemplation), or threat to our species' survival that requires control and containment and thus as autonomous, but also as vulnerable and requiring our protection, and therefore utterly dependent. Unconscious reproduction of the rationale of dominating nature runs aground the experience of nature as an entity in need of protection, and vice versa. The more nature is threatened, the more difficult and artificial become attempts to reconcile the domination of nature with our experience of nature as vulnerable, which opens up the possibility to recognise nature as more than just an object of domination or a resource of things. Prerequisite for such recognition and widening of the fracture,

however, is to rescue nature from the deterministic grasp of positivist sciences that continuously renew and assert nature as a calculable and fully determinable entity tidily severed from humans.

## 2. Knowing Nature

Nature troubles us. Not only does it today appear threatening to us, but also vulnerable to our activities. Moreover, the certainty of nature as an entity opposed to and independent from human culture has been utterly shaken.<sup>1</sup> Theses such as ‘the death of nature,’ (Carolyn Merchant 1980) or the popularity of the concepts of the ‘hybrid,’ (Bruno Latour) ‘trickster’ and ‘cyborg’ (Donna Haraway) as substitutes for the terms ‘nature’ and ‘culture’ illustrate this strikingly. We struggle, it appears, to come to terms with our current experience of the world and reconsolidate our concept of nature as well as of culture, and with them our self-perception as humans, in view of our current ambivalent experience of nature. While neither utilisation of and intrusion into nature nor environmental destruction are unprecedented in human history, human power over nature today has increased exponentially since early Modernity (Gloy 1995–6, 1:12). The associated exacerbation of certain negative

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<sup>1</sup> Following recent ecocritical discourses, it has become difficult to deploy distinctly the terms ‘nature,’ ‘culture’ and ‘society.’ However, this should not belie the fact that these concepts probably always have proven elusive. As for the distinguishing of ‘culture’ and ‘society,’ I deploy the latter term to emphasise the political, economical and ethical dimension of human existence, whereas the former is used to designate the collection of traditions, art, crafts, languages, rituals and so forth society produces, and hence as principal counter-term to ‘nature.’ (Williams 1985) For the pairing of ‘nature’ versus ‘culture’ or ‘society’ counts the same as what Adorno (2005a, 245–6) claimed for the conceptual pair of subject and object: they “are patently equivocal,” and they, “or rather what they refer to, have in a certain way priority over all definition.” Moreover, their empirical manifestation changes over time, and is visible for example to the extent that humans have come to partake in the production of natural phenomena such as climate. Culture, or society, is both part of and opposed to nature, and both sides are mediated within each other. (Cook 2011, 35–8) As a consequence, I use the pairing ‘nature’ and ‘culture’ or ‘society’ in the most conventional sense, with ‘nature’ referring to the realm of non-human made objects, and ‘culture’ or ‘society’ referring to the sphere of human production and appropriation of nature. Without intending to provide in any way a conclusive characterisation, further substantiating and deepening, in particular of the concept of nature, falls to this and the following chapters.

effects, that is, the far-reaching changes that anthropogenic adjustments of nature that manifest makes it harder to ignore the contradictions in our relationship to and understanding of nature.<sup>2</sup> Of course, there were always contested views within human history about what nature may be (cf. Gloy 1995–6). With human ability to interfere ever deeper with natural structures and processes through for example genetic engineering, the introduction of phenomena such as the hole in the ozone layer, greenhouse effect and climate change and catastrophic outbreaks of diseases such as mad cow, it has become significantly more difficult to distinctly demarcate the social and the natural. As a consequence, the association of society or culture and nature alongside our understanding and handling of nature have become central areas of scrutiny in the last decades. Over the course of these investigations, nature has long ceased to be a topic under the exclusive hegemony of the sciences. Aside from solidly established environmental branches in traditional humanities disciplines such as history, sociology, philosophy, economics and law, several new disciplines from political ecology to deep ecology and ecocriticism have developed in response to the challenges. A corresponding abundance of approaches to and theories about nature alongside nature-culture interactions have surfaced.<sup>3</sup>

One central approach in the efforts to reconcile humans and nature is to appraise differently cultural mediation(s) of nature and to hence contest the dualistic

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<sup>2</sup> With progression of environmental destruction, a common reaction is to rebuke such claims as alarmism or offset them by the claim that nature will survive regardless, suggesting that after all humans would pay the price for their actions. However, considering the degradation of the ecosystem climate change promises to cause and the havoc it will wreak on non-human species, such arguments prove anthropocentric cynicism. They seem nothing more than the continuation of the ideological techno-pragmatism that has gotten us into this situation or a helpless escape from reality.

<sup>3</sup> For overviews see, for example, Cudworth 2003; Kropp 2002; Page 2003; Pretty 2007; Sutton 2004.



framework that clearly distinguishes, separates and opposes the spheres of nature and culture. While critics of dualistic thinking often challenge the opposing of certain concepts, such as constructivist/essentialist, indeterministic/deterministic, free will/instinct, culture/nature, humans/animals, humanistic/naturalistic, mind/body, subject/object, individual/universal, concept/thing, it is usually not any specific opposition that is criticised but rather the habit of sorting the world by relying on dualistic oppositions of two, and only two, concepts, even if such dualistic thinking is criticised only on the level of a particular opposition. At the heart of this debate though lies the challenge of reconciling the awareness of the immaterial and material elements of our existence: spirit [*Geist*] and objective reality (in traditional philosophical terminology), and with them the relationship between general concepts and particular things, through which our understanding of the world forms. The prevailing criticism today, at least in the ecocritical discourse, suggests that dualist thinking in itself – that is thinking opposing concepts mutually exclusive from one another and each one independently – produces hierarchies and antagonises the conceptualised entities, an effect that ultimately would sign responsible for society's exploitative and reductionist consideration of nature. With reference to the close interrelation and indeed superimposition of nature and culture in practice, which would make a dualist conception at least today obsolete, if indeed it ever had been valid, such dualistic thinking is then met in various ways from philosophical, anthropological, sociological, political-scientific and geographical perspectives by supplanting conceptions of the world that rely on dualistic concepts of nature and culture with models that either reduce the dualism to one pole ('naturalistic' and 'sociocentric' approaches) or break it up into a multiplicity to evade the

establishment of a hierarchical relationship.<sup>4</sup> (Kropp 2002, 147–9) Yet despite substantively different conceptualisations and approaches from these perspectives, both in respect to their methods as well as proposed solutions, within their common ground of voiding the dualism of nature and culture such approaches indeed throw out the baby with the bathwater. I agree with the current critics of dualistic thought that the isolation of a material sphere on the one hand and an immaterial sphere on the other is at the heart of our current problem with nature, as well as with sociocentric approaches that nature is conceivable only in its culturally mediated and not in any primordial, unmediated form. However, discarding the dualism and implying an already existing unity rather than mediating the dualism and thereby working towards reconciliation, not unity, disposes the problem prematurely. Thereby, such declarations actually revert to an idealistic artifice that ultimately re-establishes the preponderance of the thinking human subject over its object, or humans over nature. The challenge we face, I claim and elaborate further throughout this chapter, is to overcome our adherence to the possibility of a positive and conclusive identification of the world with our knowledge of it. Since early Modern times, the conception of nature as a coherent system, on the one hand, has been increasingly expanded to incorporate the human, even if the prevailing idea of human exceptionalism leaves this expansion at the same time contradictory. On the other, it has changed to conceptualise nature in terms of processes and relativity, without however leading to a renunciation of thinking the world in terms of a coherent

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<sup>4</sup> For naturalistic approaches see: (Bookchin 1980; Catton and Dunlap 1978, 1980; Gorz 1980); for sociocentric: (Douglas and Wildavsky 1982; Luhmann 1989; Macnaghten and Urry 1998; Schwarz and Thompson 1990; Soper 1995); and for multiplicative: (Beck 1992, 1995, 2002; Descola 2013; Giddens 1990, 2009; Haraway 1989; Harvey 1996; Latour 1993, 2004; Plumwood 1993; Serres 1982, 1995)

system. Instead, the focus has shifted towards developing dynamic theories of nature capable of enfolding the system's genesis and changes into their accounts. (Cf. Gloy 1995–6, 1:222–5, 1:243–81) Science appears to respond to the evermore visible contradiction between our experience and knowledge of nature by attempting to identify the dynamics of nature and make that dynamic calculable rather than by acknowledging nature's inherently historical character. Nonetheless, science thereby indicates limitations for a complete theorisation of nature. While our knowledge produces an evermore obvious contradiction between our definitive concept and our (infinite) experience of nature, the dynamic yet comprehensive theories of nature sophistically follow science's desire for absoluteness. In contrast it seems worthwhile to ask whether "the history of science with its plurality of heterogeneous models is maybe just an expression of the limitations of our cognitive ability to determine the object definitively"<sup>5</sup> (ibid., 1:225).

Such a claim about anti-dualistic approaches seems confusing insofar as some theorists assert to wrench the object from its disqualification through its classification (the currently most prominent are Bruno Latour, Donna Haraway, Jacques Derrida, Michel Foucault, and Gilles Deleuze and Félix Guattari). An immanent critique and comparison of Edward O. Wilson's concept of consilience and Bruno Latour's actor-network theory, which follow diametrically opposed approaches to reconciling humans with nature and supplanting the dualism, highlight the limitations to adequately represent the objective world both in simple, scientific materialist unification and as a dismissal of dualisms.

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<sup>5</sup> „Hier drängt sich allerdings die Frage auf, ob die Wissenschaftsgeschichte mit ihrer Vielzahl heterogener Modelle vielleicht nur ein Ausdruck für die Begrenztheit unserer Erkenntnisfähigkeit ist, das Objekt definitiv zu erfassen.“

It has become common to conceive of any classical epistemology as inevitably dualist, and as a consequence it may seem surprising to count Wilson among the anti-dualists of our time. Nevertheless, just as much as Latour Wilson identifies the separate epistemological treatment of nature and human culture as a current shortcoming of (Western) society. And similar to Latour, Wilson approaches clarifying the relationship of humans to nature and scaling the compartmentalisation of knowledge through the devising of a somewhat alternative epistemological concept. The two thinkers radically differ, however, in their conclusions which they draw from their observations. Wilson describes culture as a natural-materialistic phenomenon, according to the methods of positivist sciences, and advocates a more consequent implementation of the descriptive, positivist epistemological project of the Enlightenment (and thus Modernity). Latour, in contrast, considers Modernity itself an artificial and failed project; he completely renounces knowledge that in his view relies on concepts such as nature and culture or subject and object, and attempts to think the world beyond its categorisation. Instead of unifying nature and culture, however, both thinkers fall back into the very dualism they claim to surpass. Indeed, recalling Max Horkheimer and Adorno, the dualism can be perceived as both true and not true at the same time, that is it has been produced and internalised over the course of human history and continues to shape human interaction with nature while ultimately remaining a sham and an idealistic transfiguration. As a consequence, the dualism of nature and culture cannot simply be put aside, but needs to be worked through within the subject to reconcile humans with nature in the course of this process. Anything else, as my discussion of Latour and Wilson illustrates, merely shrouds the problem of human domination of nature instead of overcoming it. Based

on Adorno's philosophy, the chapter's second half hence outlines a concept for mediating between nature and society.

## **Scientific Materialism**

Unity of knowledge is a long harboured human vision. The prospect of a seamlessly unified and conclusive system of explanation for the world is based on the assumption that the world is composed in a coherent and unified way that functions according to an intrinsic orderliness governed by a few natural laws. Coined originally by William Whewell (1794–1866) in 1840, consilience is the term used to speak of “the linking of facts and fact-based theory across disciplines to create a common groundwork of explanation.” (Wilson 1999, 8) According to E. O. Wilson, consilience is the ultimate guarantor for the success of such unification.<sup>6</sup> Wilson argues that the implementing of consilience is finally at our fingertips through the chance to bridge the natural sciences with the social sciences and humanities. Moreover, our contemporary social-ecological experience not only suggests the possibility of unifying knowledge across the sciences and humanities, but also makes that unification historically necessary. To illustrate this claim, Wilson asks the reader to imagine a cross, separating four quadrants describing the fields of ethics, environmental policy, social science and biology. These areas of knowledge are already closely connected, yet “undeniably each stands apart in the contemporary

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<sup>6</sup> Well aware of the scientific controversies surrounding Wilson's theses, I do not discuss *Consilience* as standard work for epistemological debates in the sciences. My intention is to highlight certain aporias in attempts to simply subsume culture under nature at the example of Wilson's approach. *Consilience*, as Wilson's epistemologically most detailed and coherent book, provides the opportunity for this. For the same reason, I ignore his other works.

academic mind" (9).<sup>7</sup> Each one of them would have its own practices, methods, analytical approaches, language and so forth, creating confusion rather than cohesion, according to Wilson. Because these disciplines inform and depend on each other, however, such disarray proves increasingly problematic. Asking the reader to draw concentric circles around the intersection of the two lines forming the cross, Wilson notes that the closer we move towards the centre of these circles the more unstable and disoriented we become. Finally, Wilson asserts that "the ring closest to the intersection, where most real-world problems exist, is the one in which fundamental analysis is most needed" (10). He tells us that this is where our current inability to analyse the real-world problems lies, leaving governments struggling to find the best policies for dealing with the most pressing challenges of our times, such as environmental challenges.

Only *in imagination* can we travel clockwise from the recognition of environmental problems and the need for soundly based policy; to the selection of solutions based on moral reasoning; to the biological foundations of that reasoning; to a grasp of social institutions as the products of biology, environment, and history. And thence back to environmental policy. (10, my emphasis)

The on-going exploration of the world through natural science, and the replacing of disciplinary boundaries "by shifting hybrid domains" (10) in the natural sciences, guarantees in contrast the possibility of consilience between all sciences, including the humanities. More importantly still, only consilience would allow us to come to terms with the hybridised problems society currently faces.

To achieve unity of knowledge through consilience, "agreement on a common body of abstract principles and evidentiary proof" (11) is required, leaving no doubts about who is to provide this common body:

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<sup>7</sup> Single page numbers in this section refer to Wilson (1999), unless stated otherwise.

With the aid of the scientific method, we have gained an encompassing view of the physical world far beyond the dreams of earlier generations. The great adventure is now beginning to turn inward, toward ourselves. In the last several decades the natural sciences have expanded to reach the borders of the social sciences and humanities. There the principle of consilient explanation guiding the advance must undergo its severest test. (72)

Because of the incredibly deep lot of knowledge of the material world that the scientific paradigm of the Enlightenment has facilitated by centuries of rigorous application of the scientific method, Wilson has no doubt that the same method will also disenchant the workings of culture and social interaction. He further substantiates his belief that the methods of the exact sciences will pass the test by citing the failure of the humanities to explain the functioning of the mind, and the already apparent success of the neurosciences to achieve this task. When he claims that the humanities have been bestrewn with irrational reasoning and reckons that the natural scientists, by abandoning “the examination of human mental life, [yielded] to philosophers and poets another century of free play,” (37) he presents such criticism with the condescending complacency of an enlightened and fully matured scientist, leaving no doubt as to who is supposed to hold the upper hand in his renewed marriage of the disciplines.

Being a natural scientist by heart, it seems obvious that Wilson suggests approaching the problem of consilience “by methods developed in the natural sciences,” although he is quick to add that he sees this not as “an effort led by scientists, or frozen in mathematical abstraction, but rather one allegiant to the habits of thought that have worked so well in exploring the material universe” (9). What Wilson does thereby and nonetheless is not, of course, to establish consilience between the interpretative workings of the humanities and the empirical ones of the natural sciences, but to turn the former into a hard science. Instead of bridging the

divide between the natural sciences and the humanities, he simply bypasses and supersedes cultural explanations for historical phenomena and describes them from the perspective of genetic biology. He creates consistency between the two spheres by extending specific natural-scientific reasoning to the humanities, and restricting cognition to this paradigm. Any critique he after all expresses at the natural sciences is directed to the lack of theoretical synthesis across different strands, not the form of scientific knowledge (cf. 41–3, 62–3, 65–6, 69). Prerequisite for the success of his project is a materialist metaphysics in which culture is ultimately restricted to a particular form of material nature. Not surprisingly then, Wilson traces consilience's metaphysical foundation back to the work of Thales of Miletus, who lived in Ionia during the sixth century B.C. and claimed "the unity of nature" (5).

Considering Wilson's authoritative standing in the natural sciences, his approach seems credible and truthful. Moreover, his quest to defend the material world and the body of knowledge produced by the natural sciences against the constructivist assumption that reality "is a state constructed by the mind, not perceived by it," (40) in Wilson's words, presents itself as honourable. Wilson's knowledge of and record in the natural sciences is no doubt impressive. As a humanities scholar, I do not intend to question his authority and capacity in this respect. Much, however, could be, and has been said (Fodor 1998; Jamieson 1998; Jung 2002; Kaufman 2013; Orr 1998; Rose and Rose 2000) about the simplistic and reductionist views by which he attempts to conquer and liberate the humanities and of his ventures into philosophy – which he certainly considers himself just as qualified to talk about as any philosopher – beginning from his naïve, idealistic and indeed unhistorical representation of the Enlightenment through to his lopsided



definition of philosophy as “the contemplation of the unknown” (12). His willingness to “plead guilty” at charges of “*conflation, simplism, ontological reductionism, scientism,*” which he expects “a few professional philosophers” to level against him, because his “agenda does not sit well with” them as they would consider the subject he addresses “their own, to be expressed in their language, their framework of formal thought,” and his reassurance that philosophy “plays a vital role in intellectual synthesis” (11, original emphasis) does little to disarm the arguments. Quite to the contrary, Wilson’s self-assured mockery of the humanities becomes entangled in an epistemological contradiction that exceeds questions of his aptitude to comment on the humanities, and instead perpetuates weighty confusions especially for the mediation of current environmental issues. If there is uninterrupted contingency across all of culture and nature, or, in other words, culture remains within natural confines, as the author insists and has to impute for his positivist concept of consilience to work, such unity would encompass the activities of the humanities, especially when one includes the creative arts, where poets and such alike are no doubt at least as much producers as they are examiners of culture. Even if the operations of the humanities were essentially irrational – they still need to be explainable by the natural sciences for Wilson’s vision of consilience to be valid. But here, Wilson’s scientific hubris turns against him at every corner of his argument. Raising positivist, empiricist natural sciences to absolute epistemological power, ceaselessly underscored throughout the book by crushing verdicts about the humanities’ incompetence, and the natural sciences’ consilient application to the whole association of the world, does not permit anything outside of this paradigm. Yet by certifying the humanities to be irrational and continuously refusing to take

them seriously, he actually verifies in spite of himself the existence of something that exceeds the grasp of the natural sciences and indeed its concept of the world and nature, and which appears consequentially unexplainable with its simple, coherent, unified materialism. One of Wilson's own stories, presumably meant to empirically confirm the evolutionary strength of the natural sciences as a human trait, exposes the problem:

On September 3–9, 1939, many of the scholars sympathetic to logical positivism met at Harvard University to attend the fifth International Congress for the Unity of Science. ... The conferees must have been badly distracted by the invasion of Poland, which began two days before the meeting started. Where the Napoleonic campaigns weakened the plausibility of the original Enlightenment, now a savage war of territorial conquest fired by a pseudoscientific theory of racial superiority threatened to make a still greater mockery of the power of reason. The scholars persisted, however, in exploring the idea that rationally acquired knowledge is the best hope of humanity. (67)

Whereas Wilson champions the unity of nature that would encompass also culture, and entrusts logical positivism with completely, or at least sufficiently unveiling its workings, according to him the scientists who are supposed to explain everything rightly turn their heads and look the other way when faced with the reason-defying events unfolding in Europe. Instead of suggesting they put their minds to unravelling the workings behind the aggressions in an attempt to help alleviate their madness, Wilson refuses even seriously to consider the events. Although the events in Europe are empirical phenomena with devastating material effects and consequences, Wilson simply dismisses them and counters almost religiously the empirical challenge they prove with his deep trust in the positivist project. Wilson's campaign for culture's rational analysis turns irrational. Contrary to explaining everything, Wilson merely disqualifies those phenomena that do not fit in his theory of a unified world as irrational, apparently vindicating his ignorance towards them. The surfacing

contradiction between the alleged rational organisation of the world explainable through the positivist sciences, and the element of irrationality acknowledged but unaddressed by Wilson, either disproves the rational organisation of nature (if culture and its irrational behaviour proves a part of nature) or places culture outside of nature. Either way, the positivist study of nature proves merely partial, and Wilson's concept of a unified knowledge under the aegis of the natural sciences explodes. Wilson's story, then, rather expresses the wounded pride and contrariness of a scientist in the face of his inability to explain the world, and the world's noncompliance with his laws of reason, than the superiority of logical positivism.

Throughout Wilson's attempt to contain humanity within a rationally organised nature, culture hence surfaces continuously and openly as autonomous antagonist to the allegedly dependent, rational factuality of nature.<sup>8</sup> Wilson indeed never escapes a culture dualistically fractured, which manifests in his account as 'irrational' and 'rational' elements. His concept of consilience between knowledge of nature and culture hence proves not a factual one, but an envisaged one, one that needs to be produced, rather than ratified, and ironically outside of Wilson's own natural-scientific paradigm. Rather than culture being part of the rational nature that the positivist sciences claim to uncover, culture's irrational element first has to be contained. As such, however, Wilson's claim for consilience itself stands for culture, or reason as an entity that exceeds the world of the factual in its ability to speculatively anticipate conditions and deliberately work towards their realisation, rather than take reality as a mere given. His containment of culture within the confines of a systematically organised nature that is restricted to the empirically given and

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<sup>8</sup> Kaufman (2013, 147–9) emphasises a similar dialectical tension in Wilson's account of morality.

accessible to positivist study, however, cannot be reconciled with such self-determining potential. Instead, this potential defies these empirical conditions and claims to transform the empirical given against its own tendencies. After all, according to Wilson destructive irrationality has only intensified from the Napoleonic wars to the pseudoscientific racism of Nazi ideology, marking out indeed the tendency of culture to descend into irrationality. Yet, Wilson has to rely on this very potential and ability for self-determination for his claim of rationalising the humanities and culture to be in any form valid. His theory becomes entangled in irresolvable contradictions. While he weightily posits that “culture has risen from the genes and forever bears their stamp,” he continues that “with the invention of metaphor and new meaning, it has at the same time acquired a life of its own” (163). Accordingly, “in order to grasp the human condition, both the genes and culture must be understood, not separately in the traditional manner of science and the humanities, but together, in recognition of the realities of human evolution” (163). By restricting his analysis to the methods and paradigm of the positivist natural sciences, however, Wilson only studies the genetic stamp of culture, not culture “in recognition of” (126) human evolution. Thus, the grand final question of “how biology and culture interact,” (126) cannot even be addressed by Wilson. Rather than the pre-eminence of the natural scientist, the worked-up derision that traverses his book (and in fact the whole humanistic side of his oeuvre, most recently in *The Social Conquest of Earth* (2012)) thus seems to vent a frustration about the inability to completely specify and define the world; hence everything that does not fall under the grip of the natural sciences gets expelled. Not only, then, does his epistemological claim lose universal validity, but his concept of consilience sees reason to be at once a mere natural fact

and a faculty that overcomes and transcends cultural realities. As a consequence, also the rationally systematic organisation of nature is called into question. Instead of reconciling reason and nature, the acclaimed unity of nature and culture disintegrates. (Cf. Horkheimer 2004, 83–5)

## **Actor-Networks**

Wilson's work exemplifies how the scientific-materialistic naturalisation of culture fails to unify nature and culture and instead becomes entangled in contradictions, confirming the dualism and, for us, calling positivist epistemologies into question. Bruno Latour (1993, 5) cites Wilson as an "emblematic" figure for naturalistic approaches to the study of nature and culture, and from there springboards to debunk naturalism. Developing his programme for changing our relationship to nature in explicit demarcation from Wilson, Latour's work seems to be a strong alternative in addressing the limitations of the naturalistic programme. Latour takes up a triple position that aims at exposing the acclaimed exclusivity of any one position of "naturalization, socialisation and deconstruction" as critical "approaches to talking about our world" (ibid., 5). Since he also recognises the mind's active and continuous re-construction of reality while simultaneously emphasising the external existence, activity and impact of nonhuman objects on this production process, he additionally promises to move beyond the dangers of reducing the world outside of us to a mere construction of our minds and thus offers the potential to reconcile humans and nonhumans, culture and nature through the social mediation of nature, which manifested through Wilson's work but remained unaddressed therein.<sup>9</sup>

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<sup>9</sup> Although Latour has retracted or reformulated aspects of his work continuously and it appears as a consequence problematic to approach it as a coherent whole, his

Similar to Wilson's account however, Latour (1993, 1–12) attests an uncontrolled and spreading production of hybrid phenomena that transgress classical disciplinary and social boundaries, and which constitute the challenge society faces today in its relationship to nature. The phenomena Latour pools under the term of the hybrid prove very diverse. Rather than any particular incidents, they are characterised by their widespread and complex effects:

On page six, I learn that the Paris AIDS virus contaminated the culture medium in Professor Gallo's laboratory; that Mr Chirac and Mr Reagan had, however, solemnly sworn not to go back over the history of that discovery; that the chemical industry is not moving fast enough to market medications which militant patient organizations are vocally demanding; that the epidemic is spreading in sub-Saharan Africa. Once again, heads of state, chemists, biologists, desperate patients and industrialists find themselves caught up in a single uncertain story mixing biology and society. (Ibid., 1–2)

Indeed, it is not the particular disciplinary field these events fall under that captures Latour's attention, but their quality of transgressing various societal sectors such as economy, politics, technology, biology and physics by forming the focal point of a web of issues, perspectives and interests, which are woven around them; hence his term of the hybrid for these phenomena. What they share in the eyes of Latour is their resistance to categorisation as phenomena either wholly of nature or wholly of

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oeuvre has developed along a clear trajectory. Starting in the 1970s with empirical anthropological studies of scientific practices, (Latour and Woolgar 1979; Latour 1996, 1987, 1988) he developed these studies in the 1990s into the theoretical framework for his Actor Network Theory (1993, 1999a), and his theory's political significance (2004). Rebutting the term Actor Network Theory in 1999, in his more recent introduction to social studies he reaffirms the title for his programme (1999b; 2005, 9). Since then, he has elaborated further on the practicalities of his research programme, testing how it, broadly speaking, might allow to represent nonhumans within our practices of law (2010, 2013). Similar to Wilson's case, my intention is to highlight contradictions arising from dismissing the dualism of subject and object for a multiplicity at the example of Latour's approach. For this, I focus on his works *We Have Never Been Modern* (1993) and *Pandora's Hope* (1999a), which primarily unfold his philosophy's conceptual framework. Others will be consulted where necessary to clarify individual elements of Latour's concept.

culture. Rather, the hybrid renders such categorisations untenable by bringing together different sets of knowledge, interests and people or institutions and blurring the traditional boundaries between nature and culture, human and animal, cultural and natural artefacts. Latour's perspective thus exceeds environmental problems in a strict sense; yet, his assertion that Western Modernity is incapable of controlling the production of hybrids that would leave "the Earth and its people to die" (ibid., 9) nevertheless reveals our current social-ecological crisis as a point of reference for Latour's rethinking of modern epistemology.

The problem, Latour (1993, 2) argues, is that the constitutional paradigm of Modernity in Western societies foils adequate understanding of hybrids, because the "analysts, thinkers, journalists and decision-makers will slice the delicate network" that these issues make visible "into tidy compartments where you will find only science, only economy, only social phenomena." Rather than accepting the commingling, Modern society instead separates the phenomena into 'knowledge of things' on the one hand, and 'power and human politics' on the other; into exact knowledge and exercise of power; into 'nature' and 'society' or 'culture,' and 'objects' and 'subjects'. A current proliferation of hybrids, however, would challenge such compartmentalisation in practice. Neither explainable by nor restricted to nature or culture (or discourse) alone, these hybrids distinguish themselves by traversing such differentiations and making them superfluous:

The ozone hole is too social and too narrated to be truly natural; the strategy of industrial firms and heads of state is too full of chemical reactions to be reduced to power and interest; the discourse of the ecosphere is too real and too social to boil down to meaning effects. Is it our fault if the networks are *simultaneously real, like nature, narrated, like discourse, and collective, like society?* (Ibid., 6, original emphasis)

Outside the realm of sciences, Latour argues, the hybrids draw our attention to the fact that the world does not exist in two separate spheres but comprises of manifold beings interacting among one another, constantly and collectively generating each other as well as reality. "Everything happens in the middle, everything passes between the two," that is, things themselves and thinking subjects as well as values and signs, while within this arena "everything happens by way of mediation, translation and networks, but this space does not exist, it has no place. It is the unthinkable, the unconscious of the moderns" (ibid., 37) and Modernity. Whereas reality is produced in the space where things and people intermingle, the stance of Modernity instead shrouds this middle ground by splitting the world up into two separate spheres of objects and subjects, thereby hiding the objects' partaking in the subject's production. Thus, "we possess hundreds of myths describing the way subjects (or the collective, or intersubjectivity, or epistemes) construct the object. ... Yet we have nothing that recounts the other aspect of the story: how objects construct the subject" (ibid., 82). As a consequence, the Modern subject has established its asymmetrical approach to the world that treats the sphere of objects, including nature, as passive and the sphere of culture, with its subjects, as active.

Latour's studies of the processes and practices of scientific knowledge production show him however that "science is very badly registered with this subject/object dichotomy," since "nothing is justifiable and solidly established with the subject/object dichotomy, because reference chains have nothing to do with that" (Tresch and Latour 2013, 309). According to him, "there is neither correspondence, nor gaps, nor even two distinct ontological domains" of language and nature, "but an entirely different phenomenon: circulating reference" (Latour 1999a, 24). While the



practical process of generating knowledge proves a line of translations that progressively replaces an object with and distances it from its textual representation, Latour first points out that this seeming impoverishment of experience of the object is simultaneously accompanied and offset by an increase in knowledge about the very object of inquiry, thus actually enriching our experience of the object. More importantly, Latour secondly highlights, it is the object of study that both shapes and initiates the whole procedure in the first place. Most crucial, however, according to Latour the actual object would in fact never be far away from the data that is drawn up to represent it, since within the process of translating an object into its textual representation the empirical researcher would never be more than one step away from the object of inquiry. Although there is thus a rupture between the object and its representation in data and knowledge, the distance becomes negligible once we take into account every step of empirical translation. Therefore, Latour can claim that

across the variations of matters/forms, scientists forge a pathway. Reduction, compression, marking, continuity, reversibility, standardization, compatibility with text and numbers – all these count infinitely more than *adequatio* alone. No step – except one – resembles the one that precedes it, yet in the end, when I read the field report, [of the expedition of soil scientists Latour accompanied to Brazil as an anthropological field study of science] I am indeed holding in my hands the forest of Boa Vista. A text truly speaks of the world. (Ibid., 61)

Latour does not hold “a piece of” (ibid., 61) Boa Vista’s forest in his hand: rather, the field report, due to the characteristics of its production process and immediate proximity to its object, provides if not an exact copy then at least an adequately truthful representation of the actual forest. The pedocomparator, in Latour’s explanation a wooden frame with a segmented drawer that houses, measures and monitors samples of soil to allow their transportation, functions as the forest floor’s *pars pro toto* (ibid., 47–8). Unfilled, the device is meaningless. Loading its drawer’s

segments with samples of soil, in turn, increases our knowledge and hence understanding of the object, while simultaneously securing the object of knowledge's proximity to its representational text and allowing for the constant verification of the representation, ensuring a truthful portrayal. The pedocomparator, Latour suggests, becomes loaded "with the meaning of the piece of earth," (ibid., 51) making the object articulate. Hence, the "world of meaning and the world of being are one and the same world" for Latour (1993, 129). Accordingly, the problem for Latour is not the process of translation of the actor into data or knowledge since this is apparently a truthful enough act. Instead, the distance between scientific knowledge of the world and the actual world only becomes a chasm, because after science's practical work has ended, the theory of science commences with the results of scientific enquiries, categorising the empirical results along the lines of subjects and objects and its derivatives, such as culture and nature, and activity and passivity. Thereby, science undermines its own scientific practices and the object, while quasi over-theorising our ability to know or not know the world. Within this process, subject and object merely "are *polemical* entities, not innocent metaphysical inhabitants of the world," and the distance between them is artificially "made *not* to be overcome" in order to "keep humanity from falling into inhumanity" (Latour 1999a, 293–4, original emphasis).

To correct the mistake of such dualistic theorising and make the hybrids perceivable, Latour calls similarly to Wilson for a restructuring of knowledge and science to end the epistemological division. He relies on a rigorous empiricism as way out. However, in contrast to Wilson's advocacy for a return and more radical implementation of the project of positivist Modernity rooted in the Enlightenment, Latour raises deep suspicions about the Modern project itself. Yet, while rebutting a

push back to pre-modern times, he surrenders neither the sciences nor even the Enlightenment completely. Instead, he intends to liberate both from their theoretical superstructure and argues for a non- or “amodern” (Latour 1993, 47) stance. Latour’s (1993, 142) non-moderns “continue to identify with the intuition of the Enlightenment” in their desire to make hidden things and forces visible. They also

continue to believe in the sciences, but instead of taking in their objectivity, their truth, their coldness, their extraterritoriality – qualities they have never had, except after the arbitrary withdrawal of epistemology – we retain what has always been most interesting about them: their daring, their experimentation, their uncertainty, their warmth, their incongruous blend of hybrids, their crazy ability to reconstitute the social bond. (Ibid.)

Rejecting the moderns’ forceful and false separation of humans and nonhumans, however, he calls for the elimination of epistemology in an attempt to turn away from the final product of any scientific endeavour, that is the text or data that represent (knowledge of) the objects, and towards the practical production of the knowledge constitutive for the scientific representations of objects (Latour 1999a, 296). By reconstructing the chain of translations the object undergoes until it becomes represented in a scientific article, rather than juxtaposing it with its replacement text, the actual object would remain visible, and thus present in the text without becoming reduced and mistaken for an exact copy. A scientific proceeding that reveals the individual steps of translations thus would reinscribe, aided by his use of the terms ‘humans’ and ‘nonhumans’ instead of ‘subject’ and ‘object,’ the actual object now as active participant or actor into our knowledge, or more precisely into our political consciousness, without, however, replacing it. (Cf. Latour 2013) Through such a science, freed from epistemological distortion and subordination, the perspective opens up on studying the world as networks of actors, whereas the borders of what to perceive as an actor is extended beyond the modern conception of the subject, or

the thinking and social human, and includes all sorts of things as influential and active figures into the networks in order to overcome the modern helplessness in regards to the proliferation of hybrids.

The focus on networks of human and nonhuman actors, finally, would turn the subject into one actor among others and the subject-object dichotomy would be avoided in the process of building knowledge. “The poles are neither disbanded to the side of nature, nor to the side of nature-dominating society, but to the in-between of indistinguishable hybrids. With this, also the problem of mastery seems to be thought out of the world”<sup>10</sup> (Winterfeld 2006, 367). Latour (1999a, 60) claims to throw a bridge “across the abyss of matter and form” that has been drawn up by modern philosophy, through following the carefully set in place procedures, methods, technologies, tools and practices of empirical research and thereby making the acting objects visible again as actors. Therefore undermining the subject’s exclusivity, Latour’s concept finally leads to his vision of a ‘Parliament of Things,’ in which humans would come to respect nonhuman actors and include them in their political decisions. Here, scientists, as representatives of the interests of nonhumans, democratically debate together with others about the future of the earth:

Let one of the representatives talk, for instance, about the ozone hole, another represent the Monsanto chemical industry, a third the workers of the same chemical industry, another the voters of New Hampshire, a fifth the meteorology of the polar regions; let still another speak in the name of the State; what does it matter, so long as they are talking about the same thing, about a quasi-object they have all created, the object-discourse-nature-society whose new properties astound us all and whose network extends from my refrigerator to the Antarctic by way of chemistry, law, the State, the economy, and satellites. (Latour 1993, 144)

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<sup>10</sup> „Die Pole werden nicht zur Seite der Natur, nicht zur Seite der naturbeherrschenden Gesellschaft, sondern zum Zwischenraum ununterscheidbarer Mischwesen hin aufgelöst. Damit scheint auch das Herrschaftsproblem aus der Welt herausgedacht.“

Thus, he proposes, nonhuman actors would find adequate political recognition within a world community alongside human actors, and the balance between people, things, corporations and so on would be re-established. Moreover, the production of hybrids would finally become visible and thereby controllable, promising a way out of our current social-ecological morass.

Putting the sweeping generalisations in Latour's version of history and the history of thought aside, (Jacob 1998; Schuster 1991; Wilding 2010) such a vision sounds promising, desirable and quite overdue.<sup>11</sup> Often misrepresented as either a

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<sup>11</sup> Especially crude and forced, for example, appears Latour's (1993, 9, 132, 145) contrasting of naturalism and socialism. With the term naturalism carrying single inverted quotation marks in the first instance of this pairing, Latour proves well aware that in the matter the two terms do not actually associate well with one another. Yet, he loses the punctuation in the following appearances. Although this relates quite obviously to Latour's interest to expose naturalism as a political movement essentially directed at banning the agency of things from our political processes and therefore to emphasise the permeability of culture and nature, politics and science, society and nature's organisation, the analogy remains odd. Rather than living up to the meaning of these terms, this shift may indeed suggest an ideologically motivated deployment of the pairing, which aims as much at discrediting the political movement of socialism by identifying it with the politically more innocent appearing term of naturalism. Latour's aggressive anti-political attitude concedes such a reading.

Latour's (1999a, 294, original emphasis) claim of science studies' radically new discovery of the apparent quality of scientific practice and sudden unsettling of centuries of philosophical thought, provides an example for his simplified representation of history: "Since an enormous number of conundrums had been attached to the theory of science, once we shifted our attention to practice all those classical topics became shaky as well. Hence the bouts of megalomania that, from time to time, seem to agitate science studies – some of them probably emanating from my own word processor. Is it our fault if so many cherished values – from theology to the very definition of the social actor, from ontology to the very conception of what a mind is – have been hooked upon a theory of science that a few months of empirical inquiries are enough to put in serious doubt?" Even though Latour clarifies that these doubts do "*not* mean that all these issues are not important, or that these values should not *be defended*," this remains a grand, historically generalising and indeed arrogant gesture. Instead, striking similarities come to mind not the least with Bacon's philosophy of scientific practice that discovered the empirical study of nature to replace the metaphysical contemplation of nature. Wilding (2010) also draws up comparisons between Latour's and Schelling's (1775–1854) models of uniting

strong constructivist or a naïve realist, Latour wields in fact a double-edged sword against the simple trust that science provides us with an exact copy of the world on the one hand, and the constructivist rejection of a material world existing independently from our mental picture of it on the other (Harman 2009; McOuat 2001; Latour 1999a, 293–4; Cordella and Shaikh 2006). He sets out to defend the nonhuman world against human dictate and adjustment through the sciences by opposing the superiority of the human subject over the natural world. Simultaneously, he attempts to rescue the nonhuman world also from postmodernist relativism. Through a ‘practical epistemology’ or ‘object-oriented philosophy’ that remains on the level of the particular, he studies the protagonists’ effects on each other. He registers the sequence of translations in the transformation of objects into knowledge, thereby remaining within specific research settings, the various protagonists participating in the production of reality. These would, accordingly, be approached symmetrically, rather than restricting some to the production of a natural reality and others to the production of a social reality (Harman 2009; Lewowicz 2003; Wheeler 2010; cf. Latour 2013). By undermining the epistemological portioning of the world into a subjective, social, active side and an objective, natural, passive side, he attempts to change Western society’s relationship to nature. In effect he attempts to recover the agency of nonhumans, limit the dominance of the human subject, and make the proliferation of hybrids visible and controllable.

Latour’s theory of actors and networks, however, raises a whole set of questions regarding responsibility and power in this new political regime: Who will

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humans and nature. This is not to say that Latour were not aware of such similarities or that there are no differences between his and the thoughts of these predecessors – but his writing remains surprisingly imprecise, generalising and excursive, considering the detailed version of scholarship he advocates.

decide on the hybrids' legitimacy and who will exert the control over the hybrids? When is a hybrid an object to be controlled? And when is it an object to be respected as nonhuman actor? Will the nonhumans decide over the fate of the hybrids – or the humans? And if it is the 'Parliament of Things,' whose interests come first? Is that not always a question of the distribution of power? Furthermore, if the scientists are to raise their voices in the interests of the nonhumans, how do they understand them? Are they not, according to Latour, speaking as mediators, thus only being able to speak for themselves? In other words, how can the political process in the 'Parliament of Things,' in which obviously only humans are present, be democratised? And how can human actors speak for nonhuman actors with neither running the risk of misrepresenting and dominating over them nor being just as loud when heard by currently more powerful human actors? For Latour, these questions vanish once we rid ourselves of producing epistemologies and the idea of an epic chasm between our minds and the world and start approaching the world symmetrically again – that is by taking humans and nonhumans equally into account as actors in the production of reality. After all, according to Latour the problem of asymmetrical power relations between humans and nonhumans has been created only by the modern obsession to think the world in dichotomous spheres of subject and object, thereby making the agency of objects invisible and reserving it for humans. Indeed, "Modernism was not an illusion, but an active performing. If we could draft a new Constitution, we would, similarly, profoundly alter the course of quasi-objects. Another Constitution will be just as effective, but it will produce different hybrids" (Latour 1993, 144–5). In other words, it is Latour's very practical epistemic project or research programme – the fathoming of the world in terms of the effects that actors have on one another in

various assemblages – that is supposed eventually to render any questions of asymmetrical positionality (such as those I pose above) out-dated, and to prepare a new political regime of peaceful interaction (Latour 1999a, 308).

Latour's call for symmetry between actors collapses, however, "by totalising the new centre"<sup>12</sup> (Winterfeld 2006, 367). With his move to describing networks, rather than asking how we can understand the actors, Latour does not try anymore to make the actors visible in their own rights. Instead, his project "amounts to modifying the place of the object to remove it from things-in-themselves and bring it to the community, but without bringing it closer to society" (Latour 1993, 82).<sup>13</sup> But the rhetoric of his statement already exposes the one modifying as predominant, and the object as victim of modification. Of course, Latour wants to stress that everything non-human is not cut off from one another, but connected within a network where every thing proves interdependent and manifests itself within the effects it has on others, including the traditional subjects. Yet in fact, Latour renders any particularities exceeding our knowledge of the object trivial by first splitting the object into a perceivable aspect, that is, all our perceivable knowledge of effects that objects exercise within their networks, and some remainder, that is, a difference between the actual actor and our representation of it in knowledge, and then declaring simultaneously the difference between our representations and the actual world negligible. Thereby, the distinctive uniqueness of each and every actor is on the one hand not remembered and conveyed individually, but abrogated in its

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<sup>12</sup> „Das Problem liegt hier in einer Totalisierung der neuen Mitte.“

<sup>13</sup> Several scholars (Noys 2012; Gamm 2001; Gransee 2003; Winterfeld 2006; Wilding 2010; McOuat 2001, 306) have highlighted Latour's idealism, yet without presenting the immanent epistemological problems at the core of his project to restructure human-nature interactions.



generalisation to a common difference across all actors; the actors are not individually different any more, but all of them are similarly different, without any particular qualification of individual differences. On the other hand, actors essentially are reduced to the perspective of the knowing human actor, who traces the networks and actors at a specific time in history, and to the effects the objects have on others, and therefore to their function and value (positive as well as negative) for others in Latour's assemblages. Latour's affirmation of the pedocomparator as conserving the integrity of the forest demonstrates this strikingly; its samples of the soil of a patch of Brazilian rainforest divided into portions by the scientists, canned in an inconspicuous transportable drawer and cut off from its interaction with the surrounding environment, suffices for Latour as referents of the whole forest floor, with its myriad connections, interrelations, interactions and particular deviations. Whereas the object thus has to surrender everything that does not come within the subject's cognitive, empirical grasp, it is the latter's perspective that proves privileged.

Latour's attempt to break the privilege from the other end by including humans as actors with the networks does little to dispel this misgiving. Quite the reverse, it only confuses the situation further, as Latour perceives the knowing human actor as simultaneously biased yet still sufficiently reliable to truthfully represent the assemblages of actors. The researcher in Latour's concept of science is not so much discerning the objects of knowledge any more, as simply providing protocols in a network alongside others. Yet even if the researcher is expected to study and represent the actors' agency – it is still him or her who registers this agency, maps the networks, and identifies the actors' qualities, effects and

relationships. Despite including the researcher with the traced networks and talking about humans and nonhumans, by being part of the network and overseeing the construction of the networks' maps at the same time, the researcher continues to hold (quite necessarily) a dual capacity. The photographs that are supposed to serve as research material in Latour's account of an expedition into the jungle of Brazil to reconstruct the chain of translation illustrate this strikingly. Whereas the other actors of Latour's network are visible within the photographs, Latour remains as investigator absent and invisible, and has to be subsequently inscribed into the report, by himself (cf. Latour 1999a, 24–79). The process of creating knowledge, the very basis of Latour's attempt to pacify the world, remains dependent on the interpretation, translation, mediation and organising of the objects we are referring to, and requires a sense of responsibility and indeed thoughtfulness from the knowing subject. Yet

as much as Latour's radical approach intimates the problems of mediation and connection – it seems at the same time to obstruct the way that could potentially lead out of the complex labyrinth of speaking humans and wordless nonhumans. Especially within respect to the problems of mediation [*Vermittlungsprobleme*], which are also always of a practical kind, it becomes clear in Latour that something is amiss in order to clarify the question of mediation: a theoretical effort, which does not stop at the symmetrisation, but understands the processes of mediation, translation and delegation as a movement, whose reflexive loops time and again break up the symmetrically superimposed relations and investigate them anew.<sup>14</sup> (Gamm 2001, 152)

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<sup>14</sup> „So sehr die Radikalität Latours die Probleme der Vermittlung und Verbindung auch deutlich macht – sie selbst scheint sich den Weg zu verstellen, der aus dem vertrackten Labyrinth von sprechenden Menschenwesen und stummer Dingwelt herausführen könnte. Gerade im Blick auf die Vermittlungsprobleme, die immer auch praktische sind, zeigt sich, was Latour in Klärung dieser Frage fehlt: eine theoretische Anstrengung, die bei der Symmetrisierung nicht stehen bleibt, die Vermittlungs-, Übersetzungs- und Delegationsprozesse vielmehr als eine Bewegung begreift, deren reflexive Schleifen die symmetrisch gesetzten Verhältnisse immer wieder aufricht und von neuem in Frage stellt.“

While it may be that “we speak truthfully because the world itself is articulated, not the other way around,” Latour (1999a, 296) no longer asks how we might be able to understand the world in its own terms but hypostatizes that all our individual empirical accounts of objects combined represent the object in some way truthfully. Noys (2012, 86) notes critically, Latour supposes “that we can reach concrete differences directly, without passing through the process of abstraction.”

Neither the asymmetry Latour intends to eliminate by tracing and describing the networks of actors nor the subject-object dichotomy are ever really left behind by Latour’s concept – his talk of ‘quasi-objects’ and ‘quasi-subjects’ reflects this perspicuously. Indeed, he does not so much avoid the subject-object dichotomy or symmetrises the hierarchy between humans and nonhumans, but rather shrouds the dichotomy and its hierarchy behind his networks of hybrids and human and nonhuman actors, thus reproducing the very phenomenon of theoretical superimposition he criticises. The effect of this manoeuvre is, on the objects’ side, the essential reduction of those objects to the perspective of the human subject and value in and for the networks. On the other side, however, the knowing human actor is dismissed from his or her epistemic responsibility towards the particularity of the objects of knowledge. Yet renouncing the act of reflecting upon the relationship between knowing subject and object of knowledge also disposes of the possibility to renegotiate specific asymmetries of power between humans and nonhumans and the latter’s usurpation by the former. Latour’s epistemic architecture thus leads straight back into the subject’s domination of the object. (Gransee 2003, 191–2) Instead of acknowledging nonhumans’ equal participation in the making of the world, Latour’s programme indeed does not reach further than adapting humanity’s claim to

hegemony to its current, ecological experience, in which humans' power of disposition over the material world emerges as limited. Thus, while his actor-network *theory* might acknowledge the changed reality that makes the effect of the natural, nonhuman world on society undeniable – his epistemic *programme* of tracing actor-networks ends up merely accounting for the objects' agency in respect to where they exert a potentially dangerous effect on the networks we are part of. Recognising a resistance in principle of the nonhuman world against its justification by humans, he immediately answers this realisation with the attempt of regaining control over the nonhumans through registering their impact. The result in principle, however, is not the acceptance of nonhumans' independence and humans' limitations in capturing the world, but a (perhaps unintentional) restoration of the Enlightenment's hope to gain control over nature. Indeed, "the mingling of natural and artificial phenomena that is currently displayed as novelty ... in a manner of speaking has always existed, without, however, leading into a complete synthesis, eliminating the differences"<sup>15</sup> (Becker 2000, 43). If we nevertheless surrender culture to nature and vice versa, we also surrender the possibility to address humanity's disproportionate impact on the natural environment and that impact's grave consequences for others, and break it into little pieces.<sup>16</sup> Sublating the hierarchy in the relationship of knowing subject and

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<sup>15</sup> „Die gegenwärtig als Novum dargestellte Vermischung natürlicher und künstlicher Phänomene ist also in gewisser Hinsicht seit jeher existent, ohne jedoch in einer vollständigen, Differenzen ausklammernden Synthese zu münden.“

<sup>16</sup> A similar critique can be extended to the work of Donna Haraway (1988, 1989, 1991). Although Haraway's kind of scientific criticism arises from a feminist perspective and turns (initially) against the self-stilised neutrality of an in fact male objectivity, her analysis of our current situation and approach to breaking the male subject's hegemony closely resemble, if not align with, Latour's perspectives. Haraway's category of the cyborg and talk of naturecultures refer similarly to the commingling of nature and culture in the production of reality and knowledge as Latour's hybrids. Her repeated evocation of messy entanglements, which Modern, male science refuses

object of knowledge appears therefore to require more than hypostatizing its mere constructedness.

### **Dialectics of Negativity**

The naturalistic approach of Wilson proves incapable of considering culture's indeterminate, or speculative element and therefore falls short of comprehending the depth and openness of nature-culture interactions. My critique of Latour's purportedly un-dualistic proceeding, in contrast, has shown how an approach that acknowledges the diversity but surrenders the difference of the subject-object relationship also risks to totalise the human perspective on nature by trivialising the nonidentity between object and concept. As a consequence, neither Wilson nor Latour prove capable of addressing the subject's mechanisms of adjusting nature in line with humanity's purposes for nature. Both, albeit in their own ways, presume a unity and harmony between humans and nature that, according to them, has been corrupted by mere theoretical considerations about the mind's isolation from the world of matter. Instead, they substitute with little success the analysis of the

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to accept but is incapable to escape, reflects Latour's claim of our inability to evade the production of hybrids. Such categorical similarities extend further to the practices that are supposed to make visible the heteronomy of the objective world and strengthen the particular against its scientific suppression. Haraway calls for the acceptance of the technoscientific intermixing of organism and machine, which represents for her the potential to effectively resist the politics of uniformity and identity. With her epistemological category of situated knowledge, finally, she equally relies on an epistemology that also turns to the particularity of specific situations. Thus she hopes to escape the perspective and dominance of the universal by inscribing the particular into our knowledge through a network of localised knowledge production. With her approach, however, Haraway similarly affirms the currently established relations of power as Latour by artificially flattening and concealing the differences between subject and object, culture and nature, human and animal, while blurring instances of appropriation and adjustment in the relationships. (Regarding similarities between Latour and Haraway see in particular Gransee 2003 and Winterfeld 2006, 367; for similar criticism of Haraway see further Becker-Schmidt 2002, 21–6; Weisberg 2009)

relationship between human subject and material object with the same tired strategies for nature's containment through its determination and representation. Rather than bringing the sciences into democracy, Carmen Gransee (2003, 192n10) describes both Latour's farewell to the subject-object relationship and the claim of the incommensurability of nature's and culture's shares in the production of reality "as an arbitrary leap forward out of the *Dialectic of Enlightenment*."<sup>17</sup>

This dialectic of enlightenment in civilisation's history was traced by Max Horkheimer and Theodor W. Adorno (2002), most prominently in their seminal work of the same title. The book provides a historic-philosophic reconstruction of the development of civilisation in its socio-evolutionary involvement with nature as a history of self-preservation through domination of nature on the grounds of subjective-instrumental, identifying reason (cf. Thyen 1989, 65). Obviously, Adorno and Horkheimer were not yet concerned with an environmental crisis, but they traced the decline of the individual in modern times, which found its horrible peak in the German gas chambers and the detonating of atomic bombs over Hiroshima and Nagasaki, back to the route enlightened reason had taken over the course of history as a means of domination of external nature. The book's key concept of enlightenment is developed by the authors in a double orientation as the historical development of instrumental reason in general, and the epoch of the Enlightenment as a particular historical phase of enlightenment, as a process of "liberating human beings from fear and installing them as masters" (Horkheimer and Adorno 2002, 1).<sup>18</sup>

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<sup>17</sup> „[Der Rückgriff auf Vormoderne Vorstellungen des Ungetrennten wirkt dagegen] wie ein willkürlicher Sprung aus der 'Dialektik der Aufklärung.'"

<sup>18</sup> Following Adorno and Horkheimer, I will distinguish between the two different meanings in the following by referring to the general concept as 'enlightenment' and the specific historical phase as 'the Enlightenment.'

The foreword to a reprint of *Dialectic of Enlightenment* from 1969 states that “the conflicts in the Third World and the renewed growth of totalitarianism are not mere historical interludes any more than, according to the *Dialectic*, fascism at that time” (ibid., xi). For the authors, fascism as well as totalitarianism were symptoms of the unreflected struggle for human mastery over nature. In this sense, the environmental crisis today, along with humanity’s inability to resolve it, appears as another such episode, albeit not as blatantly and brutally scorning the human individual as the events of the 1930s and 40s in particular. However, whereas the anti-Semitism of the early twentieth century was interpreted as a revolt of repressed nature within the individual, especially by Horkheimer, (ibid., 137–72; Horkheimer 2004, 87–109) today it is external nature that revolts against human rule rather than the repressed nature within the individual. By including nature, and the relationship between nature and reason, into their social theory, rather than approaching both as entities in themselves, the authors present a theoretical approach to the human-nature relationship that promises to be instructive for our current situation, in which the interconnectedness of humans and nature becomes inescapably obvious.

Adorno and Horkheimer’s critical theory<sup>19</sup> and in particular the book *Dialectic of Enlightenment* remain highly controversial. This is especially the case today,

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<sup>19</sup> It has come into custom to distinguish the first generation of critical theorists around Horkheimer and the Institute of Social Research under his direction (apart from Adorno, these included Herbert Marcuse (1898–1979), Friedrich Pollok (1894–1790) and Leo Löwenthal (1900–1993), as well as Walter Benjamin (1892–1940), among others) by capitalisation: Critical Theory. This is problematic in so far as it turns their work into a coherent, self-contained theory that de-historicises it, freezing it in time and closing it up, whereas the main staple of their work was to ascribe the validity of any theory a historical limit. Critical theory is a particular way of theorising and can only be comprehended in relation to the particular historical state of society and traditional theory. To emphasise this historical element of Horkheimer and Adorno’s theory, I will thus abstain from this custom.

wherein we experience a highly fragmented reality and, at least in those discourses on human-nature relations influenced by post-structuralism and post-modernism, universal claims are regarded with suspicion. After all, *Dialectic of Enlightenment* offers a trans-historical and universal critique of civilisation, that is, one that in some respects spans all human cultures throughout history. However, considering the book's subtitle, *Philosophical Fragments*, Adorno and Horkheimer did in fact recognise the fragmented quality of reality. Yet, they regarded the fragmentation of society to be a consequence of the dialectical unfolding of enlightenment, which has a determining influence on the development of human civilisation and which used historic-philosophical analyses to build a theory that was capable of explaining the specific historical situation they encountered. Considering human and natural history to be closely entwined, their thesis claims that the domination of nature and the specific characteristics of human reason and thinking that have developed in relation to the former are the driving, if unconscious forces behind European civilisation. These European ideological and technical specificities came to worldwide effect due to the vicious global spreading of European civilisation, yet without at the same time reducing history to this tendency towards dominating nature. Instead, they suggest, that

a philosophical interpretation of world history would have to show how, despite all the detours and resistances, the systematic domination over nature has been asserted more and more decisively and has integrated all internal human characteristics. Economic, political, and cultural forms would have to be derived from this position. (Horkheimer and Adorno 2002, 185)

The tendency driving history is thus neither to be considered absolute in the context of Adorno and Horkheimer's analysis, nor can it be considered apart from its specific manifestations in various moments of history. Their dialectical reading of history



assumes instead a historical processuality in which general tendencies and particular manifestations impact one another. While knowledge cannot relinquish generalisation, this says little about the prerogative of the general over the particular. "What many individual things have in common, or what constantly recurs in one individual thing, needs not be more stable, eternal, or deep than the particular. The scale of categories is not the same as that of significance" (ibid., 182). The empirical world does not exhaust within theories, whereas "classification is a condition of knowledge, not knowledge itself, and knowledge in turn dissolves classification" (ibid.). Instead, developing a historical theory means to identify commonalities through consideration of differences without discounting variations, and to elaborate specific historical situations through general commonalities derived in turn from particular manifestations of general tendencies. Abstraction, in this case identifying commonalities across cultures and histories in relation to the specificities of a historical situation, is a requirement in any attempt to explain what is happening why in a specific historical situation, and thereby to move beyond again a general understanding of history through general concepts.

### **Reason and the Domination of Nature**

Building upon Marx's analysis of society in terms of continuous human alienation from nature and his critique of political economy as background for their social theory, in Adorno's and Horkheimer's view the events of the late nineteenth and early twentieth century had proven wrong Marx's thesis that capitalism's continuous impoverishment of the working class would eventually lead to the uprising of the masses. Not doubting whether capitalism and its implementers repressed people, degraded them to commodities on the labour market and exploited their labour while

benefitting a few capitalists, as Marx and Engels had argued, their question became why the exploited classes, instead of standing up against a system that was obviously against their interest and used them to favour few, willingly submitted to it (Cf. Schweppenhäuser 2009, 3–9; Kaiser 1974; Maurizi 2007). With its two world wars and the annihilation of the individual in Auschwitz and Hiroshima finally, the first half of the twentieth century revealed the full destructive, and self-destructive potential of civilisation. Despite enlightenment and reason, “humanity, instead of entering a truly human state, is sinking into a new kind of barbarism” (Horkheimer and Adorno 2002, xiv). Following these events, human society and reason, at least in their Western, capitalistic forms could not be trusted anymore according to Adorno and Horkheimer, and Marx’s call for pursuing historical and social analysis as a scientific endeavour, therefore, became dubious, even though both authors remained deeply committed to dialectical materialism (cf. *ibid.*, xiv–xv; Buck-Morss 1977, 187). Instead, the task had become to recover enlightenment from its destructive forces through critical reflection of its properties and methods:

The aporia which faced us in our work thus proved to be the first matter we had to investigate: the self-destruction of enlightenment. We have no doubt – and herein lies our *petitio principii* – that freedom in society is inseparable from enlightenment thinking. We believe we have perceived with equal clarity, however, that the very concept of that thinking, no less than the concrete historical forms, the institutions of society with which it is intertwined, already contains the germ of the regression which is taking place everywhere today. If enlightenment does not assimilate reflection on this regressive moment, it seals its own fate. (Horkheimer and Adorno 2002, xvi)

As a consequence, in *Dialectic of Enlightenment* the authors attempt to gain “greater understanding of the intertwinement of rationality and social reality, as well as of the intertwinement, inseparable from the former, of nature and the mastery of nature” (*ibid.*, xviii).

Describing human history as a continuous anthropocentric struggle for mastery of nature to secure humanity's reproduction, Adorno and Horkheimer's concept of history is characterised by the alienation of humans from nature by human practice, which manifests itself in the increasing ability of goal-oriented manipulation and thus domination of nature. According to Horkheimer and Adorno (2002, 184–5), "the cerebral organ, human intelligence," can be considered a special human feature for the reproduction of human life,<sup>20</sup> wherein reason "acts as an instrument of adaptation" and is as such simultaneously a part of natural history and itself dialectic-historically mediated. Yet within this adaptive power lies its aporetic dilemma. "The disease of reason is that reason was born from man's urge to dominate nature, and the 'recovery' depends on insight into the nature of the original disease, not on a cure of the latest symptoms" (Horkheimer 2004, 119). The Enlightenment provides the foil for Horkheimer and Adorno to reveal the development of reason as an instrument of the domination of nature, which coincides with the increasing prevalence of spirit [*Geist*] or mental explanations over the material givenness of the world. Somewhat representing enlightenment's emancipative impulse, the Enlightenment's "program was the disenchantment of the world. It wanted to dispel myths, to overthrow fantasy with knowledge" (Horkheimer and Adorno 2002, 1). Yet instead of redeeming the potential for reconciliation that lies in enlightenment, "the mind, conquering superstition, is to rule over disenchanted nature" (ibid., 2). From the common

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<sup>20</sup> "The cerebral organ, human intelligence, is firmly established enough to constitute a regular epoch of the earth's history. In this epoch, the human species, including its machines, chemicals, and organizational powers – for why should they not be seen as a part of it as teeth are a part of the bear, since they serve the same purpose and merely function better? – is the last word in adaptation. Humans have not only overtaken their immediate predecessors but have eradicated them more thoroughly than almost any other recent species, not excluding the carnivorous saurians." (Horkheimer and Adorno 2002, 184)

perspective of the Enlightenment, people feared nature because they did not know anything about it and could not see or understand the forces that natural things displayed, which led them to ascribe agency in the form of spirits and demons to those things. But to the thinkers of the Enlightenment, “the supernatural, spirits and demons, are taken to be reflections of human beings who allow themselves to be frightened by natural phenomena,” (ibid., 4) and they condemned such mysticism as projecting human experience of subjective self-consciousness onto its natural, objective opponent.

Over the course of the Enlightenment, reason thus increasingly gave up establishing conformity with nature and instead installed the human mind as an opponent and future ruler of nature. What was previously sought to be reached through the mimetic imitation of nature turned into appropriation and reconstruction of reified material. Scientific, methodological enquiry was supposed to overcome superstition in human knowledge and thus eradicate the ‘foolish’ fear once and for all. Instead of seeing the object as an object in itself and then trying to control that object, science became the agent for the object’s rebuilding, reproducing and recreation. Humans were to venture into nature’s inside to dissect it. Every hidden characteristic of natural things had to be laid open. Systematisation that allowed for clear stock-keeping of natural resources became a keynote of the Enlightenment, represented in the science of the eighteenth century. Not even putatively magical things were to be spared, as Francis Bacon (2004, 305) makes clear, even though they were vigorously rejected by the Enlightenment, “for although things of this kind are buried in a great mass of lies and fables, they should nevertheless be examined a little just in case any natural operation lurks or subsists in any of them.” During Adorno

and Horkheimer's time, the International Congress for Unified Science, which E. O. Wilson so emphatically retrieves, represented for them the infamous successor of these tendencies.<sup>21</sup>

As a consequence, the Enlightenment cemented the alienation of humans from nature and the reification of the objective, material world. The distance between culture and nature, mind and matter, subject and object, human and animal grew and finally the reciprocal connection between humans and nature was cut. The variety, difference or multiplicity of the world had ossified in a complementary dichotomy. In contrast to mystical understanding, nature was no longer perceived as an entity in itself, but aligned exclusively in relation to human needs, thus solidifying Bacon's (2004, 301) "main intention ... that nature serves human affairs and interests." As a result, nature coalesces into a singularity of material for human production wherein individual objects are reified into exchangeable exemplars according to the general commonalities that make them classifiable. Hence, the "rabbit suffering the torment of the laboratory is seen not as a representative but, mistakenly, as a mere example" (Horkheimer and Adorno 2002, 7). The perception of the world became truly anthropocentric: the world's entirety was related just to the reasonable meanings the human subject attested to it, while "manifold affinities between existing things are supplanted by the single relationship between the subject who confers meaning and

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<sup>21</sup> Adorno and Walter Benjamin indeed represented the Institute for Social Research, under Horkheimer's aegis since 1931, at the Congress' third conference in Paris 1937. They describe the atmosphere in their report to Horkheimer as similar to classes in undenominational religious education. The place where the conference's sessions were held, the amphitheatre of geology at the Sorbonne, "was presumably supposed to help express the fiction of a laboratory of thinking, but compares to the physics laboratory of a gymnasium, where physics is held in low esteem." (Adorno and Benjamin 2003, 563)

the meaningless object, between rational significance and its accidental bearer” (ibid.).

However, because “myth sought to report, to name, to tell of origins – but therefore also to narrate, record, explain,” (Horkheimer and Adorno 2002, 5) the Animism of pre-Enlightened times by concept already carried the Enlightened thought within itself. In the essential notion of exerting control and domination over nature through its explanation and registration, according to *Dialectic of Enlightenment*, the Enlightenment indeed coincided with Animistic thinking. Both attempted influencing nature to achieve human aims and overcome the fear of nature, although the Enlightenment was much more successful in gaining power over nature through its technological appropriation and recreation based on scientific enquiry. Yet, “humans believe themselves free of fear” only “when there is no longer anything unknown” (ibid., 11). As a consequence, “nothing is allowed to remain outside” the reach of thought, “since the mere idea of the ‘outside’ is the real source of fear” (ibid.). Hence, the world’s complete determination in terms of conceptual knowledge becomes the ideal. Adorno and Horkheimer exemplify this claim through mathematics as the ultimate concept for knowledge:

When in mathematics the unknown becomes the unknown quantity in an equation, it is made into something long familiar before any value has been assigned. Nature, before and after quantum theory, is what can be registered mathematically; even what cannot be assimilated, the insoluble and irrational, is fenced in by mathematical theorems. (Ibid., 18)

Complete knowledge becomes just a question of time and the right method. In claiming the essential or complete correspondence of thought (or spirit [*Geist*]) and material object (or nature), including human physicality, however, the materiality of the world is disqualified and subsumed under the subject’s conceptual, mental

determination of the world, since it is the central quality of thought to be immaterial. As a consequence, the human subject constitutes its own identity as a thinking, mental subject, rejecting or leaving behind the awareness of its own naturalness, while reason becomes evermore stunted into an instrument of domination of nature. As counterpart to the reduction of nature to a mere material for satisfying human needs, humans were elevated to the central element of the material universe. Yet whereas it anticipates the natural world as static, determined, finite and evolving predictably according to a few fixed laws, the Enlightenment and its uncritical apologists overestimated the ability to systematise nature. Indeed, Horkheimer and Adorno argue, the claim for exhaustive conceptualisation of the world is nothing more than a trick to calm ourselves by reassuring us of the very possibility of complete control. Our contemporary crisis reveals this sham painfully and reveals the process of society as “neither just society nor just nature, but exchange of matter of humans with the latter, the permanent mediation of both moments”<sup>22</sup> (Adorno 1990b, 221).

Exemplifying how today the very idea of being in tune with nature appears self-evidently to equal nature’s domination, the recent movie *Avatar* strikingly reconfirms Adorno and Horkheimer’s thesis of reason’s instrumental development for the domination of nature. Mediating our current ecological situation, at first glance the movie seems to give an example of reconciliation. Threatened by an invasion of humans, the planet Pandora’s alien population embodies our utopian fantasy of a harmonically balanced existence between humans and nature. Portrayed

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<sup>22</sup> „Der gesellschaftliche Prozess ist weder bloß Gesellschaft noch bloße Natur, sondern Stoffwechsel der Menschen mit dieser, die permanente Vermittlung beider Momente.“

as finer evolved humanoids, rather than completely different organisms, (Cameron 2010, ch. 3, min. 7:30) the aliens appear to represent the positive hopes for our successful transition from an exploitative species to a state of sustainable reconciliation with nature. Yet the depiction of its alien-animal relationship betrays the claim for the aliens' reconciled relationship to nature, revealing it is just as much mediated by domination and control as the movie's antagonistic human counterpart. The initiation rite for hunters in the alien tribe consists of finding a dragon-like flying reptile as companion. Introduced as hunter and animal choosing one another, and from that moment on being loyal to each other unto death, the process appears to be an emancipated relationship between two equal individuals of different species. (Ibid., ch. 14, min. 56:13–56:44) Animal and person trust and care for each other and communicate on the same level. Yet, even in a movie we fail to accept the animal respectfully as partner: the hunter recognises his dragon companion because the latter attempts to kill him, and the subsequent act of befriending the dragon companion is depicted as a violent taming of a beast. Through a connection established physically between the two opponents' minds, the hunter finally achieves full control over the animal. (Ibid., ch. 16, min. 65:00–69:30) Thereby, the script lapses back into presenting the animal as something that needs to be brought under human power. The hunter's cry of victory: "Oh, shut up and fly straight!" makes the humiliation of the defeated complete (ibid., ch. 17, min. 69:03). There is not even a little acknowledgement for the proud dragon that has fought bitterly against his oppression in these words; the animal receives nothing more than a smug comment and laughter. All the pretended respect is wiped away instantaneously, uncovering the deceit. Indeed, rather than painting a utopian picture of the crisis' successful



overcoming, relying entirely on Western fantasies of superiority and domination the movie mediates our contradictory experience of nature as both threatened, in the aliens' seemingly harmonic relationship to their environment, and threat, in form of the dragon's forceful befriending.

In contrast to approaches that simply declare conformity between nature and culture, any attempt to hypostatise such unity of knowing subject and object of knowledge becomes problematic for Horkheimer and Adorno, because their division is a historical consequence of the "alienation of human consciousness from extrahuman and human nature, which is in turn a consequence of civilization" (Horkheimer 2004, 114). Enlightenment's historical untruth consists "in the fact that for the Enlightenment the process [of cognition and systematisation of the world] is always decided from the start" (Horkheimer and Adorno 1973, 24). In this respect, any rejection of the dualism, as Latour's work exemplifies, rather obfuscates elements of appropriation and domination in the nature-culture relationship. Dismissing the dualism breaks "out of the present situation by an impotent *coup de force*, instead of transcending it intellectually in conformity with the potentialities and tendencies inherent in it" (Horkheimer 2004, 115). Knowledge and thought have to take the dialectic relationship and incommensurability of subject and object seriously and keep up the tension between the two antagonists without subjugating one under the other (Zuidervaat 2007, 115).

To break the spirit's hegemony and compulsion towards domination, that is, the world's submission under the subject's thoughts through the object's identification, Adorno and Horkheimer set against its dominance a process of remembering [*Eingedenken*] nature in the subject:

Each advance of civilization has renewed not only mastery but also the prospect of its alleviation. However, while real history is woven from real suffering, which certainly does not diminish in proportion to the increase in the means of abolishing it, the fulfillment of that prospect depends on the concept. For not only does the concept, as science, distance human beings from nature, but, as the self-reflection of thought – which, in the form of science, remains fettered to the blind economic tendency – it enables the distance which perpetuates injustice to be measured. Through this remembrance of nature within the subject [*Eingedenken der Natur im Subjekt*], in the execution of which the unrecognized truth of all culture is concluded, enlightenment is opposed in principle to power. (Horkheimer and Adorno 2002, 32, translation modified)

*Eingedenken* is often translated as remembrance and remembering, but as a verbal noun the term itself proves elusive even within German. Indeed, it seems to have been cultivated particularly within Adorno's and Horkheimer's Jewish circle of philosophers of the early twentieth century, namely Ernst Bloch, Walter Benjamin, Gershom Scholem and Herbert Marcuse. (Marchesoni 2013, 9–10; Schmid Noerr 1990, 23–7) The concept is marked by an unresolved disaster in the past that continues to exert a catastrophic effect on the present, and which not merely comprehends the remembrance but a particular attitude towards memory (Moses 1993). Within the term resonates “an almost ritualistic remembrance, in which the remembered and the effort of remembering become new integral parts of the self”<sup>23</sup> (Schmid Noerr 1990, 23). Benjamin describes Proust's *mémoire involontaire* in his novel *In Search of Lost Times*, which traces its narrator's history through incidental moments in the present that take him back to moments in the past with a physiological sensitivity, as an involuntary *Eingedenken*. But it requires the immersive effort by the reader to access such content, which occurs as past visual

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<sup>23</sup> „... schwingt die Bedeutung eines fast rituellen Sich-Erinnerns mit, bei dem das Erinnernte und die Anstrengung des Sich-Erinnerns zu einem neuen Anteil des Selbst werden soll.“

images and comprises a recognition of memory's almost somatic embedment within the subject to become aware of it:

Anyone who wishes to surrender knowingly to the innermost overtones in this work must place himself in a special stratum – the bottommost – of this involuntary memory [*Eingedenken*], one in which the materials of memory no longer appear singly, as images, but tell us about a whole, amorphously and formlessly, indefinitely and weightily, in the same way as the weight of his net tells a fisherman about his catch. And his sentences are the entire muscular activity of the intelligible body; they contain the whole enormous effort to raise this catch. (Benjamin 1982, 216)

The concept thus describes a form of remembrance which knowingly becomes aware of a memory that is an inherent, somatically inscribed part of the self, without, however, interchanging the present with the past. “‘*Eingedenken*’ cannot undo violence and suffering, but only store it through its remembrance and thereby alleviate the instrumental hardening of the subject in its dealing with inner and extra nature and other subjects”<sup>24</sup> (Schmid Noerr 1990, 61–2). Instead, it is a re-actualisation in the present experience of repressed occurrences in the past, to reconsider the past events to give the repressed a new chance (Moses 1993). Indeed, if one relates it to the German adjective *eingedenk*, which means to be, become or remain effaceably aware of a memory, as well as the verb *eindenken*, which describes reflexively thinking oneself emphatically into the object or matter contemplated, *Eingedenken* indeed manifests as a particular, reflexive, cognitive comportment towards specific memories, similar to what Marchesoni (2013, 11) describes as “a blissful rapture, an ecstatic contemplation of visions, which absorb for a few moments all attention and appear more real to the dreamy subject than the surrounding

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<sup>24</sup> „Das ‘Eingedenken’ kann Gewalt und Leiden nicht rückgängig machen, sondern nur erinnernd aufbewahren und so die instrumentalistische Verhärtung des Subjekts in seinem Umgang mit innerer und äußerer Natur und mit anderen Subjekten mildern.”

reality.”<sup>25</sup> Within Adorno and Horkheimer’s motif of memory of nature in the subject then, *Eingedenken*’s quality is the recovery of thought, reason and self-consciousness as moments of nature – even if within the individual these faculties, as subjectivity, are at the same time set against the objective constitution of nature. *Eingedenken* of nature recovers thus the subject’s base within nature, both historically and actually in its own belonging to the objective world. As such, the memory of nature in the subject means “the critique of instrumental reason as function of self-preservation and the tracing of the adjusted and repressed, of the demands of living nature within the subject”<sup>26</sup> (Schmid Noerr 1990, 26). Since there is no single English term to reflect this very specific meaning, I will rely in the following on a variation of constructions and terms, such as recognition, remembrance and memory, and make the reference explicit by supplementing the German *Eingedenken* within brackets, in order to evoke the conceptual meaning while remaining within the grammatical confines of the English language.

### **Nonidentical Knowledge and Social Critique**

The subject of Modernity, as having evolved historically, is also effectively challenged in Adorno’s and Horkheimer’s view. Whereas Horkheimer, however, remained much more the critical social scientist and criticised philosophy externally, that is, by

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<sup>25</sup> „[In der dritten Strophe begegnet das Wort ‚Eingedenken,‘ namentlich in einem Zusammenhang,] wo es um eine selige Entrückung, um die ekstatische Kontemplation von Traumbildern geht, die für einige Momente alle Aufmerksamkeit für sich in Anspruch nehmen und dem verträumten Subjekt reeller als die umgebende Wirklichkeit erscheinen.“

<sup>26</sup> „... die Kritik der instrumentellen Vernunft selbst als Funktion der Selbsterhaltung und die Spurensuche nach dem durch sie Zugerichteten und Verdrängten, nach den Ansprüchen der lebendigen Natur im Subjekt, [den anarchischen Impulsen des Leibes, die unter repressiven Bedingungen nur in verzerrter Gestalt, symptomatisch, wiederkehren.]“

challenging bourgeois philosophy through confronting it with the social realities of his time, Adorno focussed his efforts for social transformation on cognition and “a consideration of the psychology which reproduces” (Buck-Morss 1977, 185, original emphasis) social structures, tracing the aporias within philosophy and reason themselves.<sup>27</sup> Contemporarily, this happened through immanent critiques of Husserl’s phenomenological and Heidegger’s existentialist philosophy (Adorno 1973b; 1973a, 67–136; 1982). On the one hand, Adorno thereby laid open the problems of the prominent philosophies of the day. On the other, his critiques sufficed as examples to draw out contradictions within the attempts to devise a first philosophy or ontology. Critical retort to Hegel’s and Kant’s philosophies, which still proved the most advanced works for philosophising about the world to Adorno, as well as the works of Nietzsche and Kierkegaard, stocked Adorno’s arsenal for his own philosophical apparatus. (Schweppenhäuser 2009, 41–2) Rather than merely confronting the subject thus with social aporias, as Horkheimer does, Adorno aims at interfering with the very structure of thought and processes of subjectification, thereby intervening in the reproduction of dominant, objective societal structures in the psychology of the bourgeois individual; “if Horkheimer’s thinking described a dialectical pattern, Adorno’s thinking *was* that pattern” (Buck-Morss 1977, 185,

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<sup>27</sup> Horkheimer’s and Adorno’s differences should not be considered minor or merely owed to intellectual abilities, but were based on earnest theoretical differences. (Stirk 1992, 53) Rather than running parallel, their works converged, something which Adorno valued far more than fruitless correspondence. (Buck-Morss 1977, 66–9; Hullot-Kentor 2006, 24–7) According to Adorno, Horkheimer saved him from “aestheticism,” whereas he strengthened “the antipositivist, speculative streak” as well as “the relevance of the representation, the particular character” in the latter. (Adorno 1965, 5) Nonetheless, Horkheimer’s approach relies much stronger on a descriptive model of immanent critique that requires sociological data, wherein his critical theory ultimately “converged with precisely the positivism it attacked” (Buck-Morss 1977, 66).

original emphasis). Because Adorno challenges the subject's very identity, I follow his critique from here on.

Central leverage for the critique provides the overcoming of the (attempted) confinement of the world to thought and the object's identification with its concept, which in a capitalistically organised society manifests and reproduces through the commodity principle that perceives all objects – including humans as resource of labour – under the principle of equivalence that makes the objects exchangeable.

Pavel Kabat's response to the dilemma of climate change and rising sea levels reflects such commodification as much as moves to assign (monetary) value to nature and natural resources today. The structure of Adorno's essays are

the antithesis of commodity structure. The form of commodities, as Marx had explained in the first chapter of *Capital*, was governed by principles of abstraction (of exchange value from use value), identity (of all commodities with each other through the medium of money), and reification (ossification of the object as a mystifying fetish by splitting it off from the process of its production). Adorno's constellations, in contrast, were constructed according to principles of differentiation, non-identity, and active transformation. (Buck-Morss 1977, 98)

In the centre of Adorno's philosophy stands the tension between the individual and the objective world. He implements his critique of the exchangeability of objects within the conceptual categories of a dualistically constituted and dialectically mediated relationship of subject and object, (Müller 1988, 120–8) which still remains topical today:

The duality of subject and object must be critically maintained against the thought's inherent claim to be total. The division, which makes the object the alien thing to be mastered and appropriates it, is indeed subjective, the result of orderly preparation; but no critique of its subjective origin will reunify the parts, once they have split in reality. (Adorno 1973a, 175)

Instead, the

separation of subject and object is both real and semblance. True, because in the realm of cognition it lends expression to the real separation, the rivenness

of the human condition, the result of the coercive historical process; untrue, because the historical separation must not be hypostatized, not magically transformed into an invariant. This contradiction in the separation of subject and object is imparted to epistemology. (Adorno 2005a, 246)

Accordingly, instead of abandoning thinking about the subject-object relationship – as Latour and several other critical philosophers argue today – Adorno sets out to criticise the subject's relationship to the world from within such epistemological traditions, which approach the determination of being through assuming the identity between being and thought. Through this proceeding he hopes “to use the strength of the subject to break through the fallacy of constitutive subjectivity,” (Adorno 1973a, xx) and rescue the individual from its liquidation in Modernity. In opposition to either an “undifferentiated unity of subject and object,” as Latour's and Wilson's claims of an essentially unmitigated access of human thinking to the objective world imply, “or their hostile antithesis,” Adorno describes the state of understanding between subject and object as

the communication of what is differentiated. Only then would the concept of communication, as an objective concept, come into its own. The present concept is so shameful because it betrays what is best – the potential for agreement between human beings and things – to the idea of imparting information between subjects according to the exigencies of subjective reason. In its proper place, even epistemologically, the relationship of subject and object would lie in a peace achieved between human beings as well as between them and their Other. Peace is the state of differentiation without domination, with the differentiated participating in each other. (Adorno 2005a, 247)

Whereas the concern for peace between subject and object traverses all of his writings, Adorno explicates his model in *Negative Dialectics* through an analysis of the conditions and possibilities of cognition, while simultaneously unfolding a model of cognition that allows for such a non-dominating cognitive mediation between subject and object, which hinges on the mediation of particular objects and generalising concepts (Schweppenhäuser 2009, 38; Thyen 1989, 132). Negative is Adorno's

philosophy in two ways: as the determinate negation of bourgeois philosophy, and as the negation of dialectics as traditionally directed ultimately towards a positive synthesis, by keeping the dialectic open and without a final, fixed outcome.

Thinking, according to Adorno (1973a, 5), is indeed subjected to an aporia between its own requisite to be tied to the act of identification on the one side, and the distinctiveness of concepts and things on the other. Whereas concepts require the empirical substrate on which they are formed and upon which they reflect – otherwise they would remain empty and arbitrary – thought can only reflect by identifying them. However, any reproduction remains a reproduction of the thing represented, not the complete, historical, empirical thing itself. As a consequence, thinking inheres a contradiction between its concepts that claim identity, and those qualities of the empirical world that fail to incorporate within the concepts. (See also Schweppenhäuser 2009, 47) Without reflecting on this aporia, the process of identification “unavoidably ruptures the actual identity of the objects of thought and subordinates them to the identity principle of the reasoning subject” (ibid., 41). Adorno’s negative-dialectical philosophy provides this reflection first through demonstrating the immanent failure of identifying thinking and thereby disproving presumptions of the reasoning subject’s primacy over the object of knowledge. Without simply reversing the hierarchy between subject and object and surrendering the subject to the primacy of the object, as Adorno’s claim for ‘*Vorrang des Objekts*’ is often translated, he secondly calls for giving priority to the object in the cognitive process (see also Adorno 2005a, 250–1). Such priority means that instead of declaring the prerequisite of the conscious, thinking subject for defining the objects, and thus essentially reducing the particular objects to general concepts, thinking has



to entrust itself to the guidance of the particular objects. (Thyen 1989, 208–10) The lever that achieves this within negative dialectics is changing the inherent “direction of conceptuality” toward the identification of the particular with the general, and gives it instead “a turn towards the nonidentical. ... Insight into the constitutive character of the nonconceptual within the concept would end the compulsive identification which the concept brings unless halted by such reflection” (Adorno 1973a, 12, translation modified). Cognition has to recover what distinguishes particular empirical things from one another and makes them unique by protecting this particularity, which Adorno engages under the concept of the nonidentical, from its subordination to the commonalities of general concepts.

Thinking aims to recognize its objects by identifying what is essential in them. Yet, as Adorno shows, it is precisely this project that the process of identification itself ensures will fail. It falls short of its aims because it can always only define its objects as examples of something else, something general. But then it fails to say what the objects themselves are. The fact that conceptual thinking – and there is no other kind – cannot positively define what is non identical in objects of knowledge is the expression of an objective aporia. For Adorno, the nonidentical is not an ‘affirmative’ concept that could be given definition, beyond the limits of rationality through ‘other,’ nonrational modes of thinking. ... It is the conceptually negative result of the defined negation of the notion of identity. (Schweppenhäuser 2009, 46–7)

Adorno’s hope for peace between subject and object, spirit and material world, human beings and things, human and animal, civilisation and nature relies on recovering the diversity, difference and heterogeneity of the empirical world from thinking’s identifying constraint. Here precisely manifests also the distinctiveness and fundamental difference of his philosophy from most other current philosophies. Commonly, the source of oppression and domination is located within the act of perceiving, for example, humans and animals as different. As a consequence, the hierarchy between them is challenged by putting special emphasis on the essential

correspondence and sameness among humans and objects, humans and things, or culture and nature, thereby declaring any difference(s) insignificant. Adorno's mainspring to overcome domination, in contrast, is accentuation, recovery and acceptance of the other's very difference. To achieve this, negative dialectics urges thinking

to immerse itself in its objects, to assure itself of the objects' qualitative elements, in the knowledge that it cannot resolve them in consciousness. Part of cognition in this sense is that the objects' recognition does not exhaust them. The nonidentical is not the unaccounted rest of cognition, but an essential element of objects, in the sense that it emerges as an instance of protest against claims of totality of the conceptual-identical.<sup>28</sup> (Thyen 1989, 210)

Rather than that the nonidentical represents merely a rest of the objects that escapes identification in concepts, Adorno locates the tension between identity and nonidentity that manifests in the constellation of concepts, cognition and the subject within the objects themselves. Adorno's nonidentical is not a simple contradiction to the identical among things, but forms a dialectical relationship within the object. As a consequence, his point is not to make objects exhaustively determinable by extending our knowledge with a category of the nonidentical that arrests what exceeds our knowledge of the object nevertheless within a concept – a point, in which it differs from Kant's thing-in-itself (Adorno 2005a, 250–1; Pradler 2003, 87–90). Rather, the objects prove themselves mediated between identity and non-identity, and therefore not simply nonidentical from one another, but nonidentical within themselves; objects are driven by the tension between their identity and nonidentity with an

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<sup>28</sup> „[Die negative-dialektische Erkenntnistheorie fordert das Denken auf,] sich in seine Gegenstände hineinzuverkennen, sich ihrer qualitativen Elemente zu versichern in dem Wissen, sie nicht in Bewusstsein auflösen zu können. Zur Erkenntnis in diesem Sinne gehört, daß sich ihre Gegenstände nicht im Erkenntsein erschöpfen. Das Nichtidentische ist nicht der unabgegoltene Rest der Erkenntnis, sondern ein ihr wesentlicher Teil, in dem sie als eine Einspruchsinstanz gegen Totalitätsansprüche des Begrifflich-Identischen auftritt.“

other; between the general and alike, and the particular and differentiated; between a species' exemplar and society, and individual – and are therefore never finitely fixed but historically moved (Adorno 2010, 19–21; Thyen 1989, 213–5). As such, Adorno's nonidentical does not refer to any metaphysical entities or elements of or within the objects, but the nonidentical describes the objects' potentiality to be something different than what they are at a specific time and place. Since the dialectic thus is placed within the objects, the process of comprehension turns from devising a complete, finite system of knowledge into an endless tracing of the contradictory tension between identity and nonidentity, without synthesis. The place for such cognition is experience:

Cognition that wants to recollect [*Eingedenken*] the nonidentical through priority of the object can be conceived with Adorno as a specific form of experience. ... Meant is a discursive, that is an experience guided and determined by reflection, which is gained from a kind of acquisition of possible objects of reflection that preserves the insoluble of the object as its freedom.<sup>29</sup> (Thyen 1989, 213)

Nonetheless, the nonidentical's representation in thought remains dependent on the mediation of concepts, and hence "is not to be obtained directly, as something positive on its part, nor is it obtained by a negation of the negative" (Adorno 1973a, 158). To redeem the potential of reconciliation, the task of cognition is neither to chase the complete determination of the objects of knowledge, nor to surrender their logical, rational examination and classification. Instead, cognition is required to reach through our concepts and identical knowledge beyond the objects' determination by concurrently remembering the inadequacy of our conceptual knowledge to fully

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<sup>29</sup> „Erkenntnis, die durch den Vorrang des Objekts des Nichtidentischen eingedenken will, läßt sich mit Adorno auch als eine spezifische Form von Erfahrung auffassen. ... Gemeint ist eine diskursive, d.h. reflexionsgeleitete und reflexionsbestimmte Erfahrung, die aus einer Weise der Aneignung von möglichen Gegenständen der Reflexion gewonnen wird, die das Unauflöslche des Objekts als dessen Freiheit bewahrt.“

permeate the objects of knowledge, and inscribe this realisation into our knowledge (Adorno 2010, 12, 164–6). We become cognisant of the nonidentical “through overcoming the *hypostasizing* of classificatory conceptual structures that are often substituted for the materiality they represent” (Schweppenhäuser 2009, 47, emphasis added). According to Adorno, such cognition based on discursive, self-reflexive experience becomes possible by perceiving the objects in constellations or models, that is, by gently palpating and approximating them within their own context by describing them through a combination of concepts. Rather than attempting to isolate and fixate the essence of the objects, such thinking would quasi-mimetically approximate the objects of knowledge, without the subject, however, giving up its autonomy in the process (Adorno 2010, 106, 240–4; Schweppenhäuser 2009, 48–9). In this respect, language

offers no mere system of signs for cognitive function. Where it appears essentially as a language, where it becomes a form of representation, it will not define its concepts. It lends objectivity to them by the relation into which it puts the concepts, centred about a thing. Language thus serves the intention of the concept to express completely what it means. By themselves, constellations represent from without, what the concept has cut away within: the “more” which the concept is equally desirous and incapable of being. By gathering around the object of cognition, the concepts potentially determine the object’s interior, attaining through thinking, what thinking necessarily excised from itself. (Adorno 1973a, 162, translation modified)

By keeping cognition and the determination of an object ultimately vacant through creating with expressions a field of tension around the object to represent it, and thereby inscribing the concept’s inadequacy into its representation of the object, it becomes possible to keep the process of cognition open and historically evolving alongside objects (Buck-Morss 1977, 96–8; Thyen 1989, 215–7).

Rejecting any immediate access to the object in *Negative Dialectics* and insisting on the object’s comprehension only through mediation, the challenge

nonetheless remains of how to access and represent something that exceeds its mediations within the limitations of its mediation without restricting it at the same time to such mediation (Pradler 2003, 121–2). Indeed, conceptual operations and procedures alone cannot realise the cognitive operation to liberate the object from its justification by identificatory thought and recover the nonidentical that Adorno calls for in *Negative Dialectics*, but additionally require aesthetics as a genuine medium of cognition and experience (cf. Zuidervaart 1991, 60). With this epistemological perspective on art, Adorno stands in the German aesthetic tradition following Alexander Baumgarten (1714–1762), the latter of who coined aesthetics analogously to the capacity of logical inquiries as a form of sensory cognition that similarly provides reliable knowledge about the world and thereby established the field as an independent philosophical discipline akin to logic (cf. Baumgarten 1983, 86–7; 2007). As with his whole philosophy, Adorno develops his concept as a materialistic turn on idealistic aesthetics in general, and in particular through a negative dialectical, immanent critical involvement with Hegel and Kant (Zenck 1977, 100; Schweppenhäuser 2009, 94–101; cf. also Zuidervaart 1991, 59). Denouncing their philosophical aesthetics as attempts to rationalise aesthetics through the determination of its categories, Adorno surpasses theirs as well as Baumgarten’s perspective of aesthetics as philosophical discipline, and raises aesthetics to a domain independent of, if not unrelated to, philosophy, without, however, reducing it to mere sensual, pre-conceptual intuition; art, according to Adorno, is indeed imbued with an immanent dialectic of rationality and mimesis (Adorno 1997, 53–5). Aesthetics’ autonomy from philosophy captures it as a refuge that enables criticism of identificatory thinking, as Adorno allows aesthetics to follow a different logic (Nho

2001, 27–8). He establishes aesthetics as nonconceptual cognition and thereby as corrective of conceptual cognition, (Zenck 1977, 100–17) which proves capable of providing an experience of the nonidentical, or its objects, the artworks, as nonidentical.

The foundation for this is Kant's claim that "aesthetic comportment is free from immediate desire" (Adorno 1997, 10). Whereas such aesthetic comportment has been excised from society and relegated to art, Adorno restores it from its shadowy existence and status as irrational:

What marks aesthetic comportment as irrational according to the criteria of dominant rationality is that art denounces the particular essence of a *ratio* that pursues means rather than ends. Art reminds us of the latter and of an objectivity freed from the categorial structure. This is the source of art's rationality, its character as knowledge. (Adorno 1997, 330, original emphasis)

Rather than accepting aesthetic experience as irrational because it does not comply with the requirements of common logic, Adorno highlights that exactly in its deviation from this common logic art proves a refuge of objective reality beyond the interests of the human subject. In contradiction to Kant, and, as it were, Hegel, who both remain within subjective superiority in the sense that aesthetic experience would be restricted to the individual and needs to be raised to objectivity through reasoning logic, Adorno retains that it is precisely art's subjective, somatic, mimetic character that constitutes its objective content and designates it as being ahead of and superordinate to conceptual cognition. Of course, rationality has always been closely interlinked with and reliant on mimesis – "cognition itself cannot be conceived without the supplement of mimesis, however that may be sublimated," since "without mimesis, the break between subject and object would be absolute and cognition impossible" (Adorno 1982, 143; see also Adorno 1997, 53–6). In the wake of human

alienation from nature and of subject from object, however, rational logic has disqualified and stunted such mimetic impulse over the course of reason's evolution as a tool for the domination of nature. Yet, according to Adorno, the mimetic ability has been preserved in art (Adorno 1997, 53; Adorno and Horkheimer 2002, 148–50).

Like everything else, the concept of mimesis undergoes a significant restoration in Adorno's analysis, without of course reaching a binding definition. Whereas in archaic times mimesis had been a kind of conduct that was directed at imitating the objective world to function as tool of self-preservation, today, having lost its mythological, magical necessity, it is a refuge of the ability and capacity to approximate oneself to an object. Such mimetic approximation has its source within the sphere of the sensory, emotional and imaginative, also the irrational and unconscious, and represents spirit's previous form that transformed into the corporal existence of early humans; "it is contrary to spirit and yet also that on which spirit ignites" (Adorno 1997, 118). Mimesis stands for the recognition and taking seriously of sensory and emotional stirrings in the relationship to an object. It does not aim at the imitation or duplication of the object's objectivity, but approaches empathically the object's particular, inherent, intangible qualities. Thus, mimesis describes a relationship to the object, which does not try to fix the object intellectually and within its physical presence, but in which the subject becomes immersed in the object beyond the conceptually subsumable (Schmid Noerr 1990, 147, 151; Nho 2001, 75–6).

Mimetic comportment – an attitude toward reality distinct from the fixated antithesis of subject and object – is seized in art – the organ of mimesis since the mimetic taboo – by semblance and, as the complement to the autonomy of form, becomes its bearer. (Adorno 1997, 110)

In this capacity, mimesis “is the border term of the rational of the conceptual, its materialistic adversary,”<sup>30</sup> (Schmid Noerr 1990, 147) and provides a safe-hold for the nonidentical and potential conduct to let the voice of the objects be heard without subjugating it to the subject’s interests. As such, mimesis cannot be conceptually fixated but remains manifest only within concrete experience (ibid.).

The work of insect researcher Maria Sibylla Merian provides an example of such experience. On the one hand, mimetic comportment stands for the nonidentical within the concept, which rational logic has repressed due to its quality of being a memory of that which conceptual thinking fails to identify and take in, and which it nevertheless remains dependent on. On the other hand, the mimetic is a cipher, placeholder and guarantor for the nonidentical of non-spiritual, material reality, the unreduced experience of the empirical world, that which remains unappropriated by the subject or the living.

Being complementary to form, mimetic comportment nevertheless is not interchangeable with aesthetic comportment. Immediate mimesis is not cognition itself; nor, for obvious reasons, is the attempt to make oneself identical with an Other successful; the assimilation remains incomplete, and therefore approximate semblance, rather than identity. Moreover, whereas mimesis is capable of perceiving the object in its own rights and beyond the subject’s rationale and interest, it requires art and artistic production to express its cognitive content. (Adorno 1997, 110–1) But due to the mimetic impulse that aesthetic comportment follows, it is indeed the object that imposes its own rationale on the subject, which realises it within the aesthetic

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<sup>30</sup> „Mimesis ist der Grenzbegriff des Rationalen des Begrifflichen selbst, dessen materialistischer Widerpart, der Begriff des Nicht-Begrifflichen, Nicht-Identischen.“



construction process, without, of course, saying anything about the success of that process.

Preartistic experience requires projection, yet aesthetic experience – precisely by virtue of the a priori primacy of subjectivity in it – is a countermovement to the subject. It demands something on the order of the self-denial of the observer, his capacity to address or recognize what aesthetic objects themselves enunciate and what they conceal. (Adorno 1997, 346)

At the same time as an artist enforces the object's rationale in the artwork, however, he or she also imposes a unity on the heterogeneity and multifariousness of the material that distinguishes the artwork from the material and objects, and indeed itself. In constructing the unity of the artwork from the single empirical elements, aesthetic comportment thus realises "more in things than they are; it is the gaze under which the given is transformed into an image" (Adorno 1997, 330) of its potentiality. Within this transformation, the artwork receives its meaning and expression not from an act of signification and therefore conceptual determination, but through an act of translating (re)semblance into a language of forms that mimetically approximates the artwork's expression to the artist's experience of the elements, materials and situations that form the object-matter of the artistic production. Thereby, art's use of forms – even in language-based art forms where artists such as James Joyce are "putting discursive language out of action" and are "trying to bring about the transformation of communicative into mimetic language" (Adorno 1997, 112) – allows the concurrent ideational realization of the general through the particular, without subordinating the one to the other. Expression's

quintessence is art's character of eloquence, fundamentally distinct from language as its medium. ... Etruscan vases in the Villa Giulia are eloquent in the highest degree and incommensurable with all communicative language. The true language of art is mute, and its muteness takes priority over poetry's significative element, which in music too is not altogether lacking. That aspect of the Etruscan vases that most resembles speech depends most likely on their

*Here I am* or *This is what I am*, a selfhood not first excised by identificatory thought from the interdependence of entities. Thus the rhinoceros, that mute animal, seems to say: 'I am a rhinoceros.' (Adorno 1997, 112, original emphasis)

Every empirical rhinoceros is always and inevitably both a nonidentical individual and a member of its generalised species at the same time (cf. Kaiser 1974, 138). As such a dual and ambiguous object, the individual artwork, although receiving identity by being formed into a coherent object, remains at the same time nonidentical (Adorno 1997, 179–80). While “art completes knowledge with what is excluded from knowledge,” it simultaneously “thereby once again impairs its character as knowledge, its univocity” (ibid., 54). As a consequence, the artist, through aesthetic comportment, is capable of becoming cognisant of the nonidentical – both in its principle of bringing the nonidentical of the concept to recognition as well as in its own quality of being a nonidentical entity, again twofold, in respect to its interlacing of the particular and general and the ambiguity of their expression. In its unidentical interlocking of particular and general insights through the use of forms the epistemological relationship between cognisant subject and object of cognition is kept in a “precarious balance” (Adorno 1997, 166), without prioritising either one over the other. (Pradler 2003, 176–8) Within aesthetic rationality, art is therefore capable of expressing the nonconceptual nonidentical, or objects as nonidentical, because aesthetic comportment assimilates itself to the object “rather than subordinating it. Such a constitutive relation of the subject to objectivity in aesthetic comportment joins eros and knowledge” (Adorno 1997, 331).

Whereas aesthetic comportment and the language of art thus are capable of expanding cognition beyond the confines of identificatory thinking by incorporating the particular, the object-matter of aesthetics “is determined negatively, as

indeterminable" (Adorno 1997, 72). Knowledge and the indeterminable are stored within authentic artworks thus incorporating the dialectical tension between the particular and the general, but within the artworks themselves this tension is, necessarily, put to a rest (Schweppenhäuser 2009, 50). For this reason, "art requires philosophy, which interprets it in order to say what it is unable to say, whereas only art is able to say it, by not saying it" (Adorno 1997, 72). Whereas artists therefore are capable of expressing the nonidentical qualities of objects – without, however, determining them – through aesthetic comportment, comprised of mimesis and the recourse to the formal language of art, conceptual thinking in turn can determine the objects, yet not determine their nonidentical qualities. To release and redeem their cognitive content, artworks hence depend upon conceptual and theoretical thinking; on contemplative and speculative interpretation that sets the dialectic between the particular and the general back into motion and reads out the knowledge stored within them.

From an epistemological perspective, *Aesthetic Theory* and *Negative Dialectics* are neither separable from, nor subsumable to one another. The two works refer and their insights stand in a dialectical tension to each other, just as "art is not an arbitrary cultural complement to science but, rather, stands in critical tension to it" (Adorno 1997, 231). In trying "to maintain a circular movement between universal concepts and particular facts without turning concepts into mere generalities, without treating facts as mere examples, and without covering up tensions between concepts and facts," (Zuidervaart 1991, 49) *Aesthetic Theory* applies the epistemological concept explicated in *Negative Dialectics* to develop and examine the concepts of art and aesthetics. In contrast, *Negative Dialectics* shuns "all aesthetic

topics” and aspires “to substitute for the unity principle, and for the paramountcy of the supraordinated concept, the idea of what would be outside the sway of such unity” consistently “by consequentially logical means” (Adorno 1973a, xx, translation modified). Nonetheless, here Adorno (ibid.) also makes explicit a relation to art, as he introduces the book in correspondence to the “‘anti-drama’ and the ‘anti-hero’” in aesthetic discussions as an “anti-system.” Following *Negative Dialectics*, *Aesthetic Theory* provides as much a corrective and a dialectical opposite to the latter as vice versa. Whereas *Negative Dialectics* explicates the philosophical correlation between cognition and experience, *Aesthetic Theory* reveals aesthetics as the determinate negation of instrumental reason, as logic’s submerged counterpart of reason. Hence, rather than understanding the limitations of *Negative Dialectics* in approaching the nonidentical as stemming from unsolved theoretical desiderata to which *Aesthetic Theory* would answer, (Pradler 2003, 121) the books are set in dialectical tension to each other and trace the nonidentical together: “For Adorno, it is the mission of both critical philosophy and authentic art to translate, without violation, the being of things into media so that we are able to recognize and experience it” (Schweppenhäuser 2009, 109, translation modified). Neither book on its own is capable of doing so; both require each other in conjunction to achieve their task.<sup>31</sup> Only in close proximity and reference to the artworks – or, rather, by remaining within the artworks – is philosophy capable of doing justice to the nonidentical

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<sup>31</sup> Indeed, Adorno’s philosophising would have not allowed for anything else without falling behind its own critical premises; he merely effectuates consequentially his claim for dialectical thinking and the incommensurability of subjective, logical, conceptual with objective, aesthetic, artistic rationality deep into the formal exposition of his concept of cognition by developing the two domains of cognition – philosophical, conceptual cognition on the one side and aesthetic, nonconceptual on the other – individually and keeping them separated in different works.

without subsuming it to the subject's constituting grasp. Thereby, philosophy confronts the subject with its own nonidentity and challenges both commodification and uniformisation of objects.

## **Animals and the Memory of Nature**

The epistemological substance of Adorno's critical theory represents just a section of his philosophy. Neither *Negative Dialectics*, and certainly not *Aesthetic Theory* are reducible to cognitive and epistemological problems, even if the question of cognition provides the mainspring of Adorno's whole critical social theory. Especially with respect to *Aesthetic Theory*, the diminution of its insights is not unproblematic. Its epistemological reflections are tightly knit into fathoming the potential of Modern artworks for experiencing the aporias of a society shaped by the commodity form, an experience that just might break the constitutive domination of exchange values. As such, his aesthetic theory is not directed at the production of knowledge, certainly not about animals. Adorno's epistemological considerations cannot be separated from his appreciation of the Modern artwork and they are difficult even to consider independently, as they appear rather implicit in the work than as its central perspective (Zenck 1977, 106). Adorno's aim was to unfold a concept of Modern art as an explosive device for the predominance of instrumental, identificatory reason by breaching identification through the reflecting confrontation of the thinking subject with itself in artworks (cf. Zuidervaart 1991, 45; Schweppenhäuser 2009, 98–9). In this respect, artworks represent the nonidentical and provide an experience of nonidentity precisely through tearing "the elements of reality out of their primary context" (Adorno 1997, 57) and abstaining from any form of representation or even reference beyond the inner workings of the artwork. What Adorno imparts about

aesthetic comportment he locates within the relationship of the artist to the artwork and the material incorporated within the artwork, not any external object or in any reference to anything external to the artwork, and thus within the artwork's inherent conditions. Yet it strikes me that the qualities of mimetic comportment and reliance on art's formal language, as they surface within aesthetic comportment, may provide a model for objective knowledge that proves capable of moving beyond objectivity's subjugation to identificatory reason. Whereas the following studies intend to elucidate and substantiate this claim, it nonetheless will be necessary to address in more detail in which way Adorno's orientation towards the artwork may or may not hamper my seizure of his epistemological concept for the study of nature at a later stage.

Albeit falling back behind Adorno's insights with my appropriation of his negative, aesthetic epistemology, such narrowing down can be explained by the critical momentum Adorno intended his philosophy to unfold in concretely interfering with the actual state of the world and the specific historical situation we find ourselves in today. Indeed, I want to suggest that Adorno's motif of memory of nature in the subject [*Eingedenken*] converges with our current historical situation in a possibly unsuspected place. The last test of courage for the warrior in the movie *Avatar* is, not by chance, fighting and taming an animal. The movie's involvement of the human with an animal reciprocates the tension of our current ambiguous experience of nature. Processing our experience of nature as a victim, the act of befriending the animal seems to attempt recanting the injustice the animal has suffered from our hands, asking, of course, for our abatement, and comforting the realisation of our own helpless position in the other. The submission of the animal

under the hunter's mastery processes our experience of nature as a threat, by reinforcing our superiority through retaining the upper hand. Yet on another level, a deeper psychological dynamic identified by Horkheimer and Adorno is being played out. In Western thought human superiority is justified by completely separating the human from the animal. "Throughout European history the idea of the human being has been expressed in contradistinction to the animal. The latter's lack of reason is the proof of human dignity" (Horkheimer and Adorno 2002, 203). Only "few other ideas are so fundamental to Western anthropology" (ibid., 204). Yet, Adorno claims, history also shows that we never could quite believe this radical difference:

The constantly encountered assertion that savages, black, Japanese are like animals, monkeys for example, is the key to the pogrom. The possibility of pogroms is decided in the moment when the gaze of a fatally-wounded animal falls on a human being. The defiance with which it repels this gaze – 'after all, it's only an animal' – reappears irresistibly in cruelties done to human beings, the perpetrators having again and again to reassure themselves that it is 'only an animal', because they could never fully believe this even of animals. (Adorno 1978, 112–3)

Whereas Adorno embeds his observation in an aphorism addressing the psychology of pogroms and the dehumanising of other humans,<sup>32</sup> his criticism dialectically affects

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<sup>32</sup> The complete aphorism reads: "*People are looking at you.* – Indignation over cruelty diminishes in proportion as the victims are less like normal readers, the more they are swarthy, 'dirty', dago-like. This throws as much light on the crimes as on the spectators. Perhaps the social schematization of perception on anti-Semites is such that they do not see Jews as human beings at all. The constantly encountered assertion that savages, black, Japanese are like animals, monkeys for example, is the key to the pogrom. The possibility of pogroms is decided in the moment when the gaze of a fatally-wounded animal falls on a human being. The defiance with which it repels this gaze – 'after all, it's only an animal' – reappears irresistibly in cruelties done to human beings, the perpetrators having again and again to reassure themselves that it is 'only an animal', because they could never fully believe this even of animals. In repressive society the concept of man is itself a parody divine likeness. The mechanism of 'pathic projection' determines that those in power perceive as human only their own reflected image, instead of reflecting back the human as precisely what is different. Murder is thus the repeated attempt, by yet greater madness, to distort the madness of such false perception into reason: what was not

the other as well, as revealed by the aphorism's title: "People are Looking at You," which represents a riposte to Paul Eipper's (1928) book *Animals are Looking at You*, a collection of empathetic discussions of photographic animal portraits. Although humans mandate mechanisms to repress the recognition even of human dignity, stirred in the perpetrator through receiving the victim's gaze, by staring down the dying eyes of animals and marking the human victim of their attack as mere brute, this conviction is incomplete – even in relation to a non-human animal, not only to other humans. In physically encountering an animal – human or non-human – something makes us uncertain of our perceived supremacy over the other. Without equalising animals and humans – the look of an animal reveals us its animal dignity.<sup>33</sup> "Human beings have not succeeded in so thoroughly repressing their likeness to animals that they are unable in an instant to recapture it" (Adorno 1997, 119).<sup>34</sup> It is difficult to imagine that Adorno did not think of Benjamin's aphorism "Gloves" when writing these lines:

In the disgust at animals, the predominant feeling is fear of being recognized by them upon contact. The horror that stirs deep in man is an obscure awareness that something lives within him that might be so little alien to the animal which nauseates him, that it might be recognized. ... He may not deny his bestial relationship with the creature, the invocation of which revolts him: he must make himself its master. (Benjamin 1996, 448, translation modified)

To confirm superiority of the reasoning subject, the dignified non-human other, just as the human other, is reified to a thing without stirrings, or, carried to an extreme,

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seen as human and yet is human, is made a thing, so that its stirrings can no longer refute the manic gaze."

<sup>33</sup> Adorno agreed that there is something to Horkheimer's remark, recalled by the former in an open letter to the latter, "that I perceived animals as human whereas you saw humans as animals" (Adorno 1965, 32).

<sup>34</sup> Ironically, it seems to have taken science some forty years to somewhat catch up with this rather unscientific insight: recent research finds, that human test subjects reliably read the emotional state of pigs from experience (Rutherford et al. 2012).



obliterated through murder, “so that its stirrings can no longer refute the manic gaze” (Adorno 1978, 113) of the solely dignity deserving superior human. Accordingly, no sooner does the warrior in *Avatar* recognise the dragon as companion and fellow other, than he subjugates the animal to his command in an attempt to retain his dignity and self-identity, removing the gloves and replacing them with whips. Moreover, when the blue-tanned master forces his will onto his dragon underling through connecting the fibre-optic cable-like ends, it is the latter’s eye which validates the completion of its subjugation: the focussed expression of a dignified creature fighting for its freedom gives way to the widened pupil of a docile, will-less servant (Cameron 2010, ch. 16, min. 68:01–68:05). Whereas in the gazing flashes of recognition the window opens in the human consciousness onto the memory of its own nature-likeness [*Eingedenken*], the challenge becomes to allow for the recognition of animal dignity and resist the animal gaze’s alleviation through reification or worse. Adorno’s model of a non-identifying cognition through aesthetic comportment promises to provide a path towards comprehending and representing animals as nonidentical, self-mediated, historical individuals and thereby not only rectifying animal reification, but simultaneously creating an opportunity for heaving the memory of nature in the subject back to the surface.

Although Adorno’s writings, and indeed Horkheimer’s as well, are teeming with animals and it is clear that their hopes for reconciliation embrace animals – Horkheimer (1993, 36) termed this as “solidarity of life in general” – Adorno never explicitly elaborated on the human-animal relationship as a connection for reminding

humans of their bonds with nature.<sup>35</sup> The reason for this, I suggest, lies in the different historical situation Adorno experienced. His philosophy was deeply influenced by the atrocious violence and all-devouring destructiveness of the First and Second World War, which culminated in the incomprehensible indifference towards the suffering individual in camps like Auschwitz as well as the detonation of atomic bombs above Hiroshima and Nagasaki. These acts of calculated and maximised destruction of human life in the most efficient fashion, which eradicated and ignored any individual specificities, revealed a potential for reducing even people to not merely exchangeable but disposable, superfluous, and indistinguishable exemplars. Hence, the times of Adorno, who “attributes a temporal core to truth,” (Horkheimer and Adorno 2002, xi) did not suggest such a line of enquiry, albeit foreshadowed in his writings. Indeed, it would have been historically false to call for the recognition of animal dignity when in fact the individual and dignity themselves were at stake. Where even human animals are denied any individuality and dignity, to call for the recognition of dignity and individuality in non-human animals proved objectively wrong and lopsided. Instead, the task was to recover traces of dignity, individuality, particularity and subjectivity per se, not extend and amend them, if the destructive forces of the process of Western civilisation were to be taken seriously and analysed adequately (Adorno 1978, 15). Hence the title of Adorno’s (ibid.) early collection of aphorisms: *Minima Moralia*. Even after the atrocities of the nineteen-thirties and forties, nature was not even remotely in the picture to provide an

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<sup>35</sup> The question of the animal in Adorno’s and Horkheimer’s, as well as in Herbert Marcuse’s writings is complicated and has not yet received sufficient, let alone sufficiently nuanced attention. Prolific, yet particular treatments of animals in Adorno’s works can be found in Gerhardt (2006), Hoffmann (2003), Mütterich (2000), Sanbonmatsu (2011) and Witt-Stahl (2007).

experience for the recognition of human ligation to nature; instead, nature was perceived to have been successfully defeated, or its defeat to be imminent. What stood in the foreground during these post-war times was the increasing administration of the world into every last corner. Human experience and perception of nature only started to change when the consequences of nature's submission became apparent in the nineteen-sixties. Following this development, today we face a different historical situation and objective world. Through our specific and ambiguous experience of nature, the window to engage with the animal's gaze is already partially open. Experiences of animals as Adorno describes them become precarious again for the memory of nature in the subject, which is not the least suggested by the exponential attention animals and our relationship with them has received in recent years. Two trends, the explosion of research in the field of human-animal studies alongside their regular appearance in feuilletons, as well as, negatively, the current disproportionate persecution of animal advocacy, may suffice to substantiate this interest as well as its ambiguous character (cf. Shapiro and DeMello 2010; Potter 2011). As a consequence, it seems historically appropriate to seize upon this opening and widen it further by resisting the reification of animals through an application of Adorno's nonidentifying cognitive model to the comprehending of animals, in order to raise the memory of nature in the subject [*Eingedenken*].

The following three studies substantiate the theoretical claims developed in this first chapter through a historical analysis of the works of three scholars who engaged in the study of animals at various times during the period of the Enlightenment. Starting from early shortcomings of the modern scientific paradigm in

conceptualising the animal at the dawn of Modernity, these scholars gradually develop a concept for an aesthetically guided, negative approach to the mediation of animals. The first study, which focuses on René Descartes (1596–1650), calls on the constitutional struggle of the Modern subject through reconsidering some of its most prolific inaugural writings. Reconstructing the development of Descartes' epistemology alongside his natural philosophy through a chronological close rereading of his oeuvre, it is possible to scrutinise Horkheimer and Adorno's thesis of the course of enlightenment, while simultaneously highlighting the challenges for the thinking subject to construct itself as an independent, coherent entity radically different from the material world alongside the subject's responses to these challenges. On the one hand, this proceeding shows the disqualification of aesthetic comportment as a legitimate approach to the study of nature in conjunction with the devising of Descartes' method to vindicate his mechanistic natural philosophy. On the other, it leads to the animal as an object of cognition that remains resistant to subsumption under Descartes' mechanistic concept of nature, representing an open wound in his writing, which he – to his credit – throughout his life fails to remediate. The second study turns to the ethology of Hermann Samuel Reimarus (1694–1768), a sharp critic of Cartesian mechanism, who proposed – a good hundred years after Descartes' death, at a time when the Modern subject had consolidated itself further and was not as vulnerable as it had been during the latter's lifetime – a solution to the questions that remained open in Cartesian natural philosophy in respect to animals. To overcome the limitations of Descartes' animal concept, Reimarus granted animals mental processes and meticulously classified them according to their behaviour, rather than their physiological properties, without, however, being less deterministic

in his conceptualisation of animal behaviour. Yet a careful and close reading of his ethological writings throws up incoherencies in his system and leads to the animal as a nonidentical entity clamped and shaped within a tension between the particular and general. At the same time, Reimarus' text, in contradiction to the claims of his author, prefigures an approach to the study and representation of animals that through its constellations of general abstractions and particular observations allows to make, if rudimentary, animals visible as nonidentical entities. Following up on this model of the animal, the third section turns to the insect studies of artist and naturalist Maria Sibylla Merian (1647–1717). Investigating the metamorphoses of moths and butterflies, Merian's work represents a cognitive approach that perceives and represents its objects of research as nonidentical through aesthetic comportment without the knowing subject disappearing in the object, and that occupies the precarious balance between subject and object in the cognitive process Adorno imputed to artworks. Merian's work thus represents an application of Adorno's aesthetic, negative dialectical epistemic model for cognition of animals and nature respectively, as well as providing a model of subjectification that breaks with the domination of the object.

As such, these three chapters empirically substantiate as well as apply Adorno's philosophy of nonidentity to nature, by developing a negative concept of the animal and epistemic approach to the study of animals through disclosing shortcomings in positivist animal concepts. Through showing these shortcomings, my examination not only signifies an approach to animals as nonidentical, but at the same time counters the reification of animals, thus itself concretely contributing to raising the memory of nature in the subject [*Eingedenken*]. Going back to the period of

the Enlightenment allows me to study the Modern subject at a time of reconstitution of human self-perception. Perceiving early Modernity as a time of renewal and upheaval, Merian's oeuvre exemplifies how the period provided potentials for the subject's emancipation from history's tendency towards domination. Her view on nature, I claim, indeed departed from the subject's path of hardening that Adorno and Horkheimer identified within today's scientific-instrumental approach to nature. With a focus on Merian's aesthetic approach to the study of zoology, a final chapter thus reconnects the historical analyses to Adorno's hopes for the reconciliation of humans and nature in response to our current historical situation. It prefigures the sketching of a negative zoology.

### **3. Identification, Descartes and the Lives of Animals**

The concept of nature effective in the technical-scientifically dominated approach to nature of Western civilisation today traces back to the epochal upheaval in central Europe at the border of the Middle Ages and Modernity. While this concept of nature has been historically adjusted to reflect the diversity and complexity of natural relations and systems, alongside their processuality and dynamism, its basic perspective remains solid: that objective nature is a coherent, regulated system of pure matter which adheres to mathematical-physical, causal-mechanistic laws; E. O. Wilson is only one of its contemporary torchbearers. Such a functionalistic perspective secures in turn the possibility of consistent and conclusive identification of nature through the intellectual, reasoning efforts of the thinking subject. The pre-Modern assumption that nature was an organic entity in itself that existed without human intervention was gradually supplanted during early Modernity by the idea of nature as a mechanical artefact produced and set in motion externally. The central difference between these two lies in the way nature was perceived to function. The pre-Modern conception of the organic saw nature as self-acting, with natural objects producing themselves from within and thus self-sufficiently, if ultimately enabled by God, gods, demons or spirits. During early Modernity this concept shifted to conceive nature as determined externally by natural laws and the mechanical forces natural objects exert on one another, and hence their position within a system. In this conception the forces were originally established and set in motion by God, but were however steerable by humans. The shift's far-reaching meaning becomes particularly obvious in the practical human relationship to nature: while in pre-Modern times the goal was to influence natural objects and phenomena by mimesis and rituals, in

Modern times the objects are appropriated, disassembled and reconfigured. (Gloy 1995–6, vol. 1)

Few are as closely associated with the shift to the Modern understanding of nature as René Descartes. Descartes' *Compendium on Music* from 1618 (referred to as *Compendium* in the following) suggests that Descartes wanted to validate a deterministic and mechanistic natural philosophy, and worked towards that goal most consistently throughout his life right into his final work, the *Passions of the Soul* from 1649 (hereafter referred to as *Passions*).<sup>1</sup> His life's work unfolds as a search for providing the foundations for such a mechanistic philosophy of nature, and his oeuvre divides into an early episode of failed, since unpublished attempts, a period marking his (apparent) breakthrough, and a final phase of consolidation. Unlike Bacon however, who foremost was concerned with the practical and organisational aspects of scientific methodology and conduct, and unlike possibly any other of his contemporaries associated with the empirical modernisation of classical philosophy in the seventeenth century, Descartes also reflected on the states of and relationship between humans' mental condition and matter (Winterfeld 2006). Descartes' philosophy claims to provide a "way of explaining how the existence or identity of a thought can depend on what is so in the world that is thought about," (Stroud 2008, 523) and the role or hindrance of sensory experience therein. Our debt to Descartes, as Stroud (ibid., 524) puts it, lies indeed in having articulated and explored, "the almost irresistible idea of a completely global independence of all thought and perception from whatever world there might happen to be that either does or does not match up to those thoughts and perceptions." Even though Descartes'

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<sup>1</sup> Gaukroger (1995) in particular emphasises the pivotal role of natural philosophy for Descartes' intellectual endeavours.



contribution to “help undermine its undeniable appeal” may seem less poignant than Stroud (ibid.) suggests, it is this question of how we might conceptualise nature in accordance with our experience that also, albeit negatively, lurks at the heart of our troubles with coming to terms with nature today. The genesis of Descartes’ oeuvre pays testimony to the individual’s struggle to submit the objective world to identification, and to the ways this struggle retroacts on the subject’s self-perception as considering itself as a being separate from nature. Accessing the process of Modern subjectification through reconstructing the cognitive, philosophical involvement of an individual with the world at the dawn of Modernity hence promises to unearth both challenges the Modern subject faced in his constituting phase as well as strategies it deployed to overcome these challenges. Thereby, it becomes possible to gain awareness of potential fractures in the subject of Modernity, which today may appear hidden underneath historical-cultural debris but seem to break open again in our current experience of the natural world.

Indeed, difficulties in establishing the place of animals in Descartes’ philosophy (Cottingham 1978, 551–2; Voss 1989, 48n53) seem to imply that Descartes remained ultimately incapable of definitively determining the object with his particular epistemological-methodological approach to building a systematic natural philosophy. Authors such as Erica Fudge (2006), Kari Weil (2012), Gary Steiner (2005), Dawne McCance (2008) and Angus Taylor (2008) highlight Descartes’ notorious mechanisation of animals. To varying extents and within different combinations, these positions explain how Descartes categorically and rigorously denies animals traits associated with humans such as feelings, thoughts, perception, emotions, consciousness, will, language, reason and self. Such accounts are countered

by assurances that his concept of the animal as machine actually has to be understood metaphorically and that Descartes by no means had denied all of these characteristics to animals, especially not such faculties as feelings, emotions and perception. Instead, Descartes' perspective on animals would prove rather intricate and in many ways anticipate the insights of Modern biology. (Cf., for example, Harrison 1991, 1992; Leiber 2011; Wee 2005; Thomas 2006; Wilson 1995) No account, however, appears yet to have provided a definitive answer. Instead, it seems that the debate divides into attempts to emphasise (often in a simplified and self-professed manner) the ruthlessness and preposterousness of Descartes' relationship to and accounts of animals on the one hand, and (often rather self-complacent and condescending) attempts to prove and rehabilitate the sophistication and complexity of Descartes' animal concept on the other.

Descartes-biographer Stephen Gaukroger's (1995, 3) dismissal of Richard Ryder's story that Descartes "alienated his wife (Descartes was in fact never married) by experimenting on the family dog" reveals the duplicity of the controversy probably best. Of course, Gaukroger, not without reason, aims at exposing today's mythologising of Descartes alongside the excesses in the reception of his philosophy regarding its repercussions – but Gaukroger's revelation hypocritically overshoots its mark. Ryder (2000, 52–3), who neither provides a source for his story nor appears well acquainted with Descartes' work or life, provides indeed an easy target. His claims are rather convenient than authoritative and let him construct Descartes as a neurotic, compassionless individual. Thereby, he reflects a scholarly tendency that only too eagerly and indeed uncritically brandishes Descartes as a deviant individual to exemplify the intrinsic inhuman rampancy of mechanism and Modern science

towards animals.<sup>2</sup> Yet, while Descartes may have not cold-heartedly alienated his indeed non-existent wife by experimenting on the family dog, he did nonetheless perform dissections of live rabbits and dogs that appear just as detached from the animal individual's suffering.<sup>3</sup> Gaukroger hence seems to use Ryder too quickly to expose hyperbolic misrepresentation of the brutal consequences of Descartes' mechanism, representing in turn a scholarly tendency that claims to provide a much more differentiated perspective on history but indeed seems just as much propelled by desperately clearing Modern science of its emotionless, mechanical character.

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<sup>2</sup> Peter Harrison (1992, 220n9) suggests that Ryder mistakes Descartes for Claude Bernard (1813–1878), whose vivisections appalled his wife and daughter (Schiller 1967, 255n83).

<sup>3</sup> In a letter to Vopiscus Fortunatus Plempius (1601–1671) from 15 February 1638, Descartes (1991, 81–2) writes: “First I opened the chest of a live rabbit and removed the ribs to expose the heart and the trunk and removed the ribs to expose the heart and the trunk of the aorta. I then tied the aorta with a thread a good distance from the heart, and separated it from all its attachments, so that there could be no reason to suspect that any blood or spirits could enter it from anywhere else but the heart. Then, making an incision in the aorta with a scalpel, between the heart and the ligature, I saw perfectly clearly that when the artery dilated, blood gushed out of the incision, but when it contracted, no blood flowed out. ... / Continuing the vivisection, I cut away half the heart, the half known as the apex; and from the moment this was separated from the base I noticed that it did not beat even once.” His during his lifetime unpublished treatise *Description of the Human Body* (Descartes 1998, [1647–8], 180) adds: “... if one cuts the point of the heart of a living dog, and through the incision one puts one's finger into one of its ventricles, one will clearly feel that every time the heart shortens it presses the finger, and that it will stop pressing it whenever it is elongated.” And: “... if one cuts the point of the heart of a young rabbit that is still alive, the naked eye shows that its ventricles become a little larger and expel blood at the moment at which the heart hardens, and even when it expels only small drops of blood, because very little blood remains in the animal's body, they continue to have the same size. ... What makes this much less apparent in the heart of a dog or some other more vigorous animal than in a young rabbit is that the fibres take up more of the ventricles; they stiffen when the heart hardens and can press against a finger inserted into one of the ventricles.” (Ibid., 181)

Rosenfield (1968, 158–60) suggests that Descartes' niece Catherine (1637–1706), who generally held her uncle in high esteem, strongly rejected to his views on animals.

In contrast, Descartes' actual relationship to animals significantly complicates these two positions. Whereas in principle Descartes considered animals automated machines and seemingly had little problems cutting open other dogs alive, he also kept a pet dog named Monsieur Grat, who, Graukroger (1995, 384) speculates warmly, joined him during "regular morning walks." Descartes allegedly even sent him, "together with a little female," to Claude Picot (1614–1668) "in order to give the breed to the abbot," (Baillet, in Descartes 1963, 17n2, my translation from French) thereby singling out this individual from the commons.<sup>4</sup> "What strange, potent magic these little machines can work" after all! (Rosenfield 1968, 70) Descartes, hence, was maybe "never completely comfortable with strict dualism, however emphatically he affirmed it" (Cottingham 1978, 559). Gordon Baker and Katherine Morris (1993) have provided the most nuanced and in many ways most accurate consideration of Descartes' dualism to date. Even though ultimately rehabilitating Descartes' dualistic perspective, if in very different form, their reading intriguingly recontextualises Descartes' philosophy for a reconsideration of the relationship between mind and matter, humans and nature or animals. However, rather than reconceptualising this relationship, my reading of Descartes is concerned with epistemological problems and challenges to the knowing subject's decisive identification of the objective world within conceptual knowledge. Indeed, turned towards the epistemic object, the contradictions and uncertainties surrounding Descartes' human-animal dualism suggest that animals as objects of knowledge somehow resist univocal identification. The controversy surrounding Descartes' views on animals reflects the highly ambivalent position he holds in today's scholarly landscape. Whereas his philosophy

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<sup>4</sup> The incident is handed down by Descartes' first biographer, Adrien Baillet (1649–1706), who mentions it in regard to Descartes' letter to Picot from 28 February 1648.

and indeed he himself as a person have been the target of extensive and, often unfairly, scathing criticism over the centuries following his death, and his philosophical claims appear largely out of date today, his legacy and influence on Western philosophy has become ingrained into Modern consciousness, and his thinking remains an important point of reference for many philosophical endeavours, not the least my own. This equivocal, Descartes' magnitude in the history of ideas as one of the major constitutional figures of Western Modernity, the breadth of secondary literature his body of work has sparked and the innumerable conflicting readings of his works pose significant challenges. Honouring the work that has been done in as much as finding one's own voice within the scholarly landscape and doing justice to Descartes' original depositions provides a daring task, at least for any attempt that intends to engage with Descartes' philosophy at large. This even more bears on a work such as mine, which devotes itself not exclusively to his philosophy but turns to Descartes as an example for evaluating the subject's mediation of nature during early Modernity. However, neither are questions of his philosophy's impartial legitimacy nor its rightful or wrongful legacy of concern here, but a reconstruction of the formation of Descartes' philosophy in consideration of contradictions he apparently struggled with, the ways in which he might have solved them and potential gaps that remained, and thus intellectual historic-biographical challenges. As a consequence, rather than evaluating Descartes' thinking from an outside perspective, I take an immanent perspective on Descartes' work that reconstructs his intellectual involvement with the world in detail and measures it against his own claims, rather than external standards. Whereas most biographical accounts are of limited help for this task, Stephen Gaukroger's (1995) detailed and comprehensive

intellectual biography serves throughout as a model of reflection to develop my own perspective of the intellectual development of Descartes' philosophy. Due to the pervasiveness and distortion of Descartes' thinking in today's culture as well as my aim to re-enact his cognitive, intellectual struggle with the world, I let Descartes speak for himself as often as possible and more frequently than probably common. Additionally, I focus my reading, starting from the *Compendium*, on his major works, as these can be considered to reflect his views most properly, and aid this reading with his correspondence where necessary, for example to clarify his views on animals towards the final years of his career. Such confinement proves predominantly necessary to keep this chapter within reasonable bounds.

### **Musical-Hydraulic Prolegomena**

Drafting the *Compendium on Music* as a New Years present to his friend Isaac Beeckman (1588–1637), Descartes (52–3)<sup>5</sup> did not intend the piece for publication, and its theory of music remains fairly crude; Descartes himself criticised it later in his career.<sup>6</sup> Moreover, as it is firmly rooted within and not exceeding traditional views of music as a mathematical discipline, the *Compendium* holds a rather secondary status in Descartes' oeuvre (Gaukroger 1995, 74–80). As a consequence, the treatise's intellectual achievements are of little interest in themselves, but as the earliest extant document of Descartes' scientific interests, it does provide a revealing starting point

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<sup>5</sup> When unspecified, the referenced page numbers in this section hereafter refer to: Descartes (1961, *Compendium* [1618]).

<sup>6</sup> "Descartes evidently came to the conclusion that it was fruitless, even erroneous, to attempt to correlate music and the emotions," according to Charles Kent (Descartes 1961, 52n57). Kent (ibid., 55–6) also provides a list of letters in which Descartes between 1629 and 1634 elaborates on his theory of music. The *Compendium* was published posthumously, in 1653.

for a consideration of the development of the objectives of Descartes' philosophy, as it sets the tone and direction of his later work (Augst 1965, 119–20).

Descartes opens his treatise with the assertion that the “basis of music is sound; its aim is to please and to arouse various emotions in us” (11). To achieve this, music deploys two compositional or productive means, “namely, its differences of duration or time, and its differences of tension from high to low,” whereas the “quality of tone itself (from what body and what means it emanates in the most pleasing manner) is in the domain of the physicist” (11). Thus Descartes firmly roots his musical theory in a materialist natural philosophy. To be capable of evoking pleasure, rather than discomfort, first “a proportional relation of some kind between the object and the sense itself must be present,” and second this “proportion must be arithmetic,” making the production and improvement of music accessible to mathematical analysis (11–2). Having set down these preliminaries, Descartes goes on to examine the musical proportions that arouse emotions in order to index them for compositional purposes through an arithmetical analysis of musical consonances, as one “must find all the consonances by this method” (21). The fifth, for example, is “of all the consonances the most pleasing and acceptable to the ear,” (23) while the fourth “is the unhappiest of all consonances, and must never be used in composition except incidentally”(24). In the treatise's last part Descartes moves on to utilising the obtained knowledge about sounds and their interrelation with the human organism, as it “follows from what has been said that we can compose music without grave error or solecism if we will but observe the following three rules” (46). Whereas the rules themselves are of no particular interest here, the reduction of artistic composition to a mathematical production process exemplifies the ends to which

Descartes intends to put his analysis, that is the technical appropriation of nature. Finally, the means of an ideal appropriation are complemented with a concept of equally proportional and idealised musical reception and understanding. According to Descartes, “while we are listening to an imperfect consonance the ear expects a more perfect one on which it may rest; this is caused by natural instinct” (47). The joy or displeasure resulting from music hence is not a question of subjective preferences and taste, but of pure natural disposition.

The *Compendium* thus provides a manual aimed at improving the arrangement of sounds into music to enhance the listener’s pleasure based on a mathematical analysis of its object, the natural phenomenon of sound and tone, and its effect on our emotions (Clarke 2006, 44). While music due to its mathematical character obviously works very well as example for a proportional, arithmetic analysis, Descartes does not restrict the applicability of his approach solely to music. Asserting that “poetry is supposed to arouse the emotions in the same manner,” (51) he allows material other than the musical to be analysed and processed in the exact same standardised manner. Neither Beeckman nor Descartes, however, were particularly musical; they were more interested in the scientific and physical aspects of music, even if the logical consequences of Descartes’ considerations are by no means insignificant for music. Considering moreover that the *Compendium* was a private present, instead of a treatise genuinely concerned with music, it rather seems to showcase to Beeckman the kind of epistemological, nature-philosophical project Descartes had in mind through applying his intellectual reckoning to a concrete subject matter. Indeed, in a letter to Beeckman dating from early 1619, Descartes explains that what



I want to produce is not something like Lull's *Ars Brevis*,<sup>7</sup> but rather a completely new science, which would provide a general solution of all possible equations involving any sort of quantity, whether continuous or discrete, each according to its nature. (To Beeckman from 23 April 1619, in Descartes 1991, 2)

Whereas Descartes is aware of the sizeable task he has set himself, he claims to "have caught a glimpse of some sort of light, and with the aid of this I think I shall be able to dispel even the thickest obscurities" (ibid., 3). Further evidence of the aid Descartes envisions can be discovered in a private notebook containing thoughts scribbled down between 1619 and 1621.<sup>8</sup> There he notes that "as an adolescent I have [often] wondered, in encountering an ingenious invention, whether I could not discover it without having read its author. Through this I gradually realized that I use certain rules" (Descartes 2011, *Notebook* [1619/20], 191).<sup>9</sup> A few pages further he even suggests that the "propositions of the sages can be reduced to very few general rules" (ibid., 197).

The aim of this science was methodically to develop mathematics into a means of solving any kind of theoretical problem, whereas his *Compendium* reflects his particular interest in physical questions, which during the seventeenth century

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<sup>7</sup> In his *Compendium on Method*, the Catalan author Ramon Llull (1232–1315/16) proposes a universal method of solving problems. Composed in 1308 and thus initially confined to dissemination by transcripts, the book was finally printed in 1481.

<sup>8</sup> The notebook was listed in the inventory made of Descartes' belongings after his death in Stockholm 1649 by French ambassador to Sweden, Pierre Chanut (1601–1662), but the original manuscript has since been lost. Its contents were partially handed down by a copy Gottfried Wilhelm Leibniz (1646–1716) made of it in 1676 and which was first published in 1859. (Wohlers 2011, vii, xv)

<sup>9</sup> John Schuster (1982) shows that such an account by Descartes hardly reflects reality, as his discoveries did not follow a strict method but are much better in line with Kuhn's (1996) theory of scientific discovery. Schuster's claim is unproblematic for my account, however, as rather than discussing Descartes' method as a path to knowledge I consider Descartes' philosophy and epistemology as exerting a disciplining effect on the subject-object relationship.

translate into questions of natural philosophy (Clarke 2006, 46). That Descartes “stays firmly within the realms of mathematics, evidently either unable or unwilling to make the crucial transition to a consideration of the problem [of music] in terms of the physical nature of sound” (Gaukroger 1995, 79–80) is consequently not as surprising as it first appears, but also misses the treatise’s point. Indeed, in more general terms the *Compendium* is an example of guiding the reworking of given materials to maximise human pleasure and joy through a systematic, methodical and mathematically conducted analysis of the characteristics and qualities of a particular physical phenomenon or corporeal object. Its primary goal is not to solve musical problems, but instead to exemplify Descartes’ vision, thereby exceeding the perspective of mathematics, if not in the treatise’s attempt to come to terms with the phenomenon of sound itself. (Cf. Augst, 1965; Lohmann, 1979, 84–5, 100) That his final work, the *Passions*, returns to the question of emotions and their incitement, reveals Descartes’ adherence to the project of definitively, unmistakably and unambiguously indexing the world – or, in other words, its identification – in order to appropriate and reconfigure natural, non-human-made phenomena in accordance with human (emotional) needs. This is the project prefigured in the *Compendium*, and which will remain a contingent driving force behind Descartes’ subsequent philosophical efforts.<sup>10</sup> Accordingly, the epistemological vision of a comprehensive and certain determination of the world, accessible to the thinking subject through the guidance of a method and backed up by a concept of the object as unequivocally, unambiguously and definitively determinable through mathematical analysis,

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<sup>10</sup> Larry Jorgensen (2012, 408) highlights the same contingency between *Compendium* and *Passions*, if affirmatively in the context of quantifying aesthetic values.

emerges as principal point of departure for Descartes' intellectual pursuits.

(Lohmann 1979)

Descartes' specific approach as envisaged in the *Compendium* reflects this goal as much as it arises from the intellectual debates of his time. During the late sixteenth and early seventeenth century, the empirical failure of Aristotelian science became more and more obvious and was ascribed to methodological insufficiencies. The aporia undermining its authority were the steps Aristotle followed in his logical, scientific reasoning. Deriving first principles from empirical phenomena, these exact first principles were then supposed to lead to a qualitatively different, or deeper understanding of empirical phenomena when applied to the latter's explanation. The deficiency was twofold: on the one hand, Aristotelian logic produced a circularity in its argumentation, on the other, it did not allow certain proofs for its inferences, hence not providing any absolute certainty about the world's structure. As a consequence of the systematic challenges that were put to Aristotelian science and its results, a new account of both natural philosophy and methodology became necessary. (Gaukroger 1995, 112–3; also 1989) The curriculum at the Jesuit school of La Flèche at Anjou, where Descartes was educated from 1606 until 1614, would have included the study of Christianised versions of classical texts, dialectics,<sup>11</sup> natural philosophy, metaphysics, ethics and mathematics. Especially the application of the latter at La Flèche reflects, if not matches, Descartes' intentions strikingly.

Mathematical subjects were classified

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<sup>11</sup> "Dialectics" refers in the context of the sixteenth and seventeenth century to the study of logic, whereas at Jesuit schools this primarily comprised, quite revealingly, of "the formal study of syllogistic, the application of syllogistic to scientific reasoning, and the discovery of appropriate arguments ... as a theory of the regulation of the functions of cognition" (Gaukroger 1995, 54).

based on a distinction between those disciplines studying things in abstraction from their matter (roughly corresponding to Aristotle's conception of mathematics), and those that study sensible objects mathematically (roughly corresponding to Aristotle's 'subordinate sciences'). In the first category are geometry and arithmetic; in the second are astrology, perspective, geodesy, music, calculation and practical arithmetic, and mechanics. (Gaukroger 1995, 58)

In this approach, special emphasis lay "on the usefulness of the mathematical sciences in," among other things, "the infinite divisibility of continuous quantities, tides, winds, comets, the rainbow, and other meteorological phenomena; and 'the proportions of motions, qualities, actions, passions, reactions, and so forth'" (ibid.). This list almost reads like a summary of Descartes' oeuvre, even if his interest in these topics was probably only kindled after he had left La Flèche, upon meeting Beeckman (ibid., 59). Moreover, the list reflects the interweaving of problems and approaches to solving the topics' Descartes engaged with throughout his career, particularly at the stage of the *Compendium*.

Mechanics was another prominent topic during Descartes' times, both in intellectual discourses, as it can be seen from the mathematical curriculum at La Flèche, and as a technical means. The Royal Gardens of Saint-Germain outside of Paris, for example, not only contained a series of fanciful fountains, but even several grottoes that housed hydraulically powered moving and talking statues. At some point in his career, Descartes compared and exemplified his own physiological account of the movements of human and non-human animal bodies by means of their striking resemblance to the artefacts at Saint-Germain. Whereas in animated bodies animal spirits, "have the power to change the shapes of the muscles into which these nerves are embedded, and in this way to move all the limbs" through entering nerves, this can be similarly observed in the Gardens' hydraulic machinery, where

the force that drives the water from its source is all that is needed to move various machines, and even to make them play certain instruments or pronounce certain words, depending on the particular arrangements of the pipes through which the water is conducted. (Descartes 1998, *World* [1629–33], 107)

Descartes spent the time between leaving La Flèche in 1614 and commencing his law studies 1615 in Poitiers most likely in Saint-Germain-en-Lay (Gaukroger 1995, 62–4). The statues thus might have functioned not only as example but even as model for Descartes' mechanised idea of nature.<sup>12</sup> After all, the intricate hydraulic model for the movements of animated bodies in the *Passions* (Descartes 1989, *Passions* [1644–6/49], 18–49) is also based on this account. A precursor in human-made artefacts for his model of the body as automaton, however, marks out the model's origin in an already appropriated, reconstructed and idealised image of nature and suggests a speculative, purposeful character of Descartes' concept of mechanism as a tool of imagination. Rather than being a concept derived from careful engagement with nature, mechanism seems to have provided a particularly convincing explanation for the determinateness of corporeality and nature's potential deciphering, without, of course, suggesting that Descartes acted in a calculating manner. The assumption that it was intellectually preconceived, rather than empirically derived, is further supported by the fact that his close friend Marin Mersenne (1588–1648) probably like no one else during the early seventeenth century worked on developing

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<sup>12</sup> This assumption is further supported by Desmond Clarke, who suggests that Salomon de Caus' (1576–1626) book *The Explanation of Moving Forces, With Various Machines, Both Useful and Decorative; to Which are Added Various Designs for Grottoes and Fountains* (1615) that describes the Gardens may have served as model for Descartes' physiology (Clarke 2006, 92–3). Considering that Descartes never mentions the book in his correspondence but explicitly refers to the Gardens in his treatise (Descartes 1998, *World* [1629–33], 107) and the fact that de Caus' book was published around the time Descartes left Saint-Germain-en-Lay, it seems much more likely that the actual automatons of the Royal Gardens served initially as model.

mechanism as a general natural-philosophical position in opposition to Renaissance naturalism. The central point of Mersenne's efforts was to disprove the assumption that nature in some way is self-active, self-intentional or self-willing in order to defend the supernatural against its incorporation into the natural by naturalism. To achieve this, Mersenne favours a quantitative understanding of nature and extols the merits of mechanism for such an understanding. (Gaukroger 1995, 147–9; cf. Hutchison 1983) Rather than as a concept derived from observation of nature and plausibly accounting for experiences of nature, the idea of mechanism surfaces instead as a conceptualisation routed firmly within intellectual merits and securing, guaranteeing and affirming the controllability and exploitability of nature.

On the one hand then, the *Compendium* reveals the context for Descartes' following writings and thereby provides an immanent point of reference that allows to measure Descartes' work against his own demands, to lay open the problems Descartes struggled with in achieving his aims and to evaluate the means with which he scales these hurdles. On the other, however, the treatise's very objectives reflect the compulsion of thinking towards identification, that is the submission and restriction of empirical phenomena to concepts, rather than a turn to the object's particular demands of cognition. Especially the origin of his epistemological approach within the cultural artefacts of Saint-Germain's grottoes further substantiates Descartes' project as being driven by the very need to conceptually identify and thereby dominate the world rather than a careful consideration of the object of knowledge. This is also not changed by the assurance that Descartes' philosophy had turned to the empirical or was empirically substantiated (for example Garber 2001; Kirkiebøen 1998); rather, it seems that, within the very historical moment of turning

towards the empirical and experience of the object of knowledge, Descartes attempts to secure the identity of object and concept and thus the primacy of the subject against the experience of the object. Combining epistemological with nature-philosophical, mathematical and even anthropological assumptions, Descartes' *Compendium* proves already remarkably dense, coherent and comprehensive in its approach, both in respect to providing the technical means to achieve the world's identification and to theoretically substantiating its very possibility. Within this, neither Descartes' epistemology nor his mechanistic philosophy of nature appear to be merely ends in themselves, but rather means as much as ends to allow for the world's disenchantment and systematic, cohesive identification. Especially his natural philosophy inherits an ambivalent place in such a project, as it is both foundation and predetermined endpoint of his project at the same time, whereas his epistemology in turn is supposed to provide the means for producing his natural philosophy, rather than an untainted consideration of the conditions of cognition. Descartes is well aware that in aiming to develop a science capable of solving any equation possible, and which amounts in the context of his mechanistic philosophy of nature to nothing less than nature's complete determination and appropriation, he sets himself a "gigantic task, and one hardly suitable for one person; indeed it is an incredibly ambitious project" (to Beeckman from 23 April 1619, in Descartes 1991, 2). The nineteen years that pass by until his first publication in 1637, the *Discourse on the Method* (hereafter referred to as *Discourse and Essays*),<sup>13</sup> suggest that the lucidity of the *Compendium* indeed belies the argumentative, intellectual difficulties he faces to

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<sup>13</sup> The work's full title reads *Discourse on the Method of Rightly Conducting one's Reason and Seeking the Truth in the Sciences, and in Addition the Optics, the Meteorology and the Geometry, Which are Essays in This Method*.

support his ambitions. During his early career Descartes struggles poignantly with the task of disenchanting the object.

### **The Object's Elusiveness**

The *Rules for the Direction of the Native Intelligence*, composed in two stages 1619–1620 and 1625–1628 and hereafter referred to as *Rules*, represents Descartes' first attempt to provide a path to nature's disenchantment.<sup>14</sup> It elaborates his theory of knowledge in order to develop a set of rules for the systematic, methodical and comprehensive deciphering of the world as prefigured in the *Compendium*. In the first set of eleven rules, composed during the earlier phase, Descartes establishes a criterion and logical foundation for truth. He then abandoned the project to apply himself to mathematical and optical examinations that seem unrelated to the specific questions the early rules address. Returning to the *Rules* in 1626, Descartes reworked parts of the manuscript (rules Four and Eight) and composed rules Twelve to Twenty-One (with only headings for rules Nineteen to Twenty-One), before finally abandoning the project some time in 1628. The rules from this second compositional phase are primarily concerned with questions of cognition and mathematics as a tool for problem solving. (Gaukroger 1995, 111–2) In Rule Twelve, Descartes projected the treatise to comprise three sets of twelve rules each, but he never finished the manuscript or prepared it for publication (50–1).<sup>15</sup>

The shift in focus between the different compositional phases as well as the unfinished state of the manuscript cause significant fragmentation of the text (cf.

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<sup>14</sup> The work was original composed in Latin under the title *Regulae ad directionem ingenii*.

<sup>15</sup> When not further specified, the referenced page numbers in this section hereafter refer to: Descartes (1985, *Rules* [1619–28]).



discussion in Wohlers 2011). Despite a change occurring in how Descartes addresses his intellectual matter during the two compositional phases, retracing the philosophical development of the work through its various stages suggests that Descartes followed a consistent objective and approach throughout the 1620s until the final abandoning of the *Rules* in 1628; the second compositional phase does not bring recommencement but merely expansion from theory to application.

Accordingly, both the thematic change from one compositional phase to the other as well as the point at which Descartes finally abandons work on the *Rules* reveal problems and obstacles he faced in his project. On the one hand, the project's very fragmentation allows insights for a negative consideration of the limitations of Descartes' early works along its fractures. Yet because Descartes never finalised the project, the manuscript's fractures cannot, on the other hand, unequivocally be identified as either immanent problems or merely consequences of the fact that the project remained at draft stage. Moreover, there is no correspondence available that could aid in identifying what challenges Descartes faced in its composition. Even in a negative reconstruction of the challenges Descartes struggles with in his philosophy, any conclusions have to remain preliminary and speculative as a consequence.

Instead, the meaning of the *Rules*' failure for Descartes' general intellectual project reveals retrospectively within the context of the further progression of his work.

Opening the *Rules*, Descartes advises the reader that "the aim of our studies should be to direct the mind with a view to forming true and sound judgements about whatever comes before it," (9) thus introducing the production of knowledge<sup>16</sup> as the treatise's central theme. Rule One then provides a general discussion of the

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<sup>16</sup> Descartes' uses the term knowledge (*scientia* in the Latin original) to denote systematic knowledge based on indubitable foundations.

consistency of knowledge, since according to Descartes the scientific endeavour has so far been hindered by the assumption that the different scientific areas, just as the different arts, require separate skills and techniques depending on their different objects of enquiry. He proclaims that, on the contrary, “the sciences as a whole are nothing other than human wisdom, which always remains one and the same, however different the subjects to which it is applied” (9). Thus, in the First rule Descartes unifies the different areas as well as forms of knowledge and consequently the approach through which knowledge is acquired.

If, therefore, someone seriously wishes to investigate the truth of things, he ought not to select one science in particular, for they are all interconnected and interdependent. He should, rather, consider simply how to increase the natural light of reason. (10)

Essentially, this prepares the way for complete systematisation on the one hand and universal applicability of Descartes’ rules on the other, while simultaneously introducing reason as foundation and guarantor for true knowledge – for which making best use of Descartes’ rules will provide the tool.

Consistently dismissing every knowledge proposition that is “merely probable,” Descartes restricts the acquisition of knowledge in the Second rule to “certain and evident cognition,” because only such propositions are “perfectly known and impossible of being doubted” (10). According to Descartes,

there are two ways of arriving at a knowledge of things – through experience and through deduction. Moreover, we must note that while our experiences of things are often deceptive, the deduction or pure inference of one thing from another can never be performed wrongly by an intellect which is in the least degree rational, though we may fail to make the inference if we do not see it. (12)

Rejecting experience as a reliable source for the building of knowledge, Descartes confirms deduction not only as a viable source but even as one impervious to failure, as long as it rests upon “the natural light of ... reason,” (10) which guides the way to

certainly true knowledge. Any failure in discovering the truth is solely attributed to weaknesses in the individual's ability to discern the natural light of reason and correctly deduct one truth from the other, abilities that have been clouded and left undeveloped by traditional learning (Clarke 2006, 87). In Rule Three, Descartes further elaborates that concerning "objects proposed for study, we ought to investigate what we can clearly and evidently intuit or deduce with certainty ... For knowledge can be attained in no other way" (13). Finally, by intuition Descartes means "the conception of a clear and attentive mind, which is so easy and distinct that there can be no room for doubt about what we are understanding ... [and] which proceeds solely from the light of reason" (14).

It has been pointed out that Descartes' employment of terms is at times rather inconsistent and therefore confusing (Clarke 1982). This is certainly true for his use of the terms 'deduction' (or 'inference') and 'intuition' in these two rules, but a closer consideration of his conception reconciles these problems while revealing an important premise in Descartes' concept of reason (cf. Gaukroger 1995, 115–6; Clarke 2006, 88–9). The confusion stems from the interrelation of two concepts, which are commonly understood as being diametrically opposed to each other. According to common understanding, 'deduction' and 'inference' both suggest a conscious, active, rational involvement of the mind in drawing a conclusion, while 'intuition' describes a mental process occurring without active involvement of the reasoning mind; whereas the latter is an immediate act of cognition the former relies on a mediating process of reasoning actively performed by the subject. Commonly, 'deduction' and 'intuition' are respectively deployed to distinguish mediated and immediate cognitive procedures. Descartes' usage of the term 'deduction' (or 'inference'), however,

suggests in fact that deduction is essentially the same process as intuition. As a consequence, Descartes' application of the terms seems indiscriminate here, but Descartes anticipates such criticism and defends his use declaring that he freely adapts different terms to his needs. Especially,

there may be some doubt here about our reason for suggesting another mode of knowing in addition to intuition, *viz.* deduction, by which we mean the inference of something as following necessarily from some other propositions which are known with certainty. But this distinction had to be made, since very many facts which are not self-evident are known with certainty, provided they are inferred from true and known principles through a continuous and uninterrupted movement of thought in which each individual proposition is clearly intuited. (15)

Indeed, if we look at the concepts of the natural light of reason and clear and evident cognition from within Descartes' system of thought, it becomes apparent that intuition and deduction are merely different levels of a naturally occurring process of reasoning, with a highly fluid gradation (Gaukroger 1995, 117–8). According to Descartes, mental intuition is an immediate act of apprehension that provides us with first principles (or simple natures, as he also refers to them in the rules from the second compositional phase), and that derives its certainty from being self-evident in a way we cannot doubt its truth, for example that one exists and thinks. Deduction on the other hand is the process of comprehending things, which are composites of first principles and thus cannot be known instantaneously. Rather, these objects have to be divided and approached along the lines of first principles to be established without doubt. However, since this process relies on correlating intuited ideas, neither intuition nor deduction can fail or be incorrect as long as the agent performing these acts is bestowed with the natural light of reason, which guides intuition and deduction. Reason, then, is for Descartes not something we apply to objects from the outside in order to extract their meaning, but a faculty that is innate in creatures,

which represents the true essence of things within the rational subject and always delivers true and sound judgements. The act of reasoning for Descartes is not active or open but a definitive process within us that provides access to the true essence of things and which manifests in our clear and distinct cognition. Effectively, however, Descartes' concept disqualifies experience as a reliable form of producing knowledge, and limits truth or knowledge to specific mental representations of the objects of inquiry, that are, clear and distinct ideas.

Descartes rests the viability of his criteria for truth on our instantaneous grasp of clear and distinct intuitions alongside the power they have to convince us of their truth. Gaukroger (1995, 122–3) traces the doctrine's character back to the rhetorical-psychological theories of Roman writers, particularly the writings of Quintilian (circa 35–100), and the qualities of images. In *Institutio oratoria* (around 95 AD), Quintilian proposes that vividly illustrating facts, that is, representing them as distinct entities, indeed exceeds simple perspicuity because whereas clarity merely allows the reader to see something, vivid illustration “thrusts itself upon our attention” (Quintilian quoted in *ibid.*, 123). To achieve such distinctness in writing,

we must assimilate ourselves to the emotions of those who are genuinely so affected, and our eloquence must spring from the same feeling that we desire to produce in the mind of the judge. Will he grieve who can find no trace of grief in the words with which I seek to move him to grief? ... It is utterly impossible. Fire alone can kindle, and moisture alone can wet, nor can one thing impart any colour to another save that which it possesses itself. Accordingly, the first essential is that those feelings should prevail with us that we wish to prevail with the judge, and that we should be moved ourselves before we attempt to move others. (Quintilian quoted in *ibid.*)

Quintilian finally bases the generation of convincing emotions on the evidential quality of images, since, as Gaukroger (*ibid.*) elaborates, “self-conviction, like the conviction of one's audience, depends on the qualities of the image, amongst which

must figure clarity (*perspicuitas*) and vividness (*evidentia*).” Accordingly, something is convincing if it is presented in such a way that one can grasp its evidential force in an instant. What is at the core of Descartes’ doctrine of true cognition, at least at this point of his thinking, is therefore a theory of representation and analysis that utilises the power of truth of clear and distinct perceptions, and which for Descartes equals the truth. Yet, although neither our intuition nor deduction can fail, the difficulty is to recognise clear and distinct intuitions and deductions correctly. Such recognition requires

reliable rules which are easy to apply, and such that if one follows them exactly, one will never take what is false to be true or fruitlessly expend one’s mental efforts, but will gradually and constantly increase one’s knowledge till one arrives at a true understanding of everything within one’s capacity. (16)

The paradigmatic model for such clear and distinct perception, or images, is provided for Descartes by mathematics, and in particular arithmetic and geometry. They

alone are concerned with an object so pure and simple that they make no assumptions that experience might render uncertain; they consist entirely in deducing conclusions by means of rational arguments. They are therefore the easiest and clearest of all the sciences and have just the sort of object we are looking for. (12–3)

Hence, Descartes turns Quintilian’s conception of truth through clear and distinct representation around and provides it as foundation for objective cognition. Backed-up by the faculty of (the natural light of) reason, his set of rules provides a manual to derive at principles perceivable so clearly and distinctly in one’s mind that they are completely self-convincing and therefore true. Within this, the Fourth Rule elaborates further on the necessity of a method to produce knowledge, despite the innateness of the procedures the natural light of reason provides for discovering the truth. Rule Five to Seven explain how we proceed with the method: how to generally apply the method to an object or problem respectively by dissolving complex matters into

simpler ones, how to recognise simple elements and how to establish continuity between the simple elements to grasp the totality of complex matters. The remaining rules Eight to Eleven elaborate on specific points relevant to the application of Descartes' method in order to recognise first principles.

Due to the quality of first principles that the subject grasps instantaneously, the paradigmatic case for the criterion to recognise such simple truths is some form of images, in particular arithmetical analyses and geometrical representations. Indeed, both arithmetic and geometry provide an application of Quintilian's considerations of truth by virtue of being perceived instantaneously, and hence force themselves on the reader. But Quintilian's theory is even more important for Descartes' project, as it additionally provides a foundation for the convincing representation of the truth to others, and thus extends absolute certainty beyond oneself. Through this reckoning, Descartes hopes to secure certainty within our knowledge of the objective world as well as to prevent errors in the process of securing such knowledge. In total, the first eleven rules thus provide a conceptual framework for the possibility of certain knowledge, as well as for uncovering the intellectual means to improve our recognition of the truth without however applying those means to concrete objects or problems.

Some time in 1620, Descartes abandons his manuscript and occupies himself with studies in mathematics (arithmetic and geometry) and, later, also (geometrical) optics. These pursuits seem at first glance unrelated to the trajectory of the set of rules he had been working on until now, which "were dominated by methodological concerns, and above all with the question of what constitutes compelling evidence for something and how we come by such evidence" (Gaukroger 1995, 152). In the set of

rules he composes after 1626, Descartes in contrast is concerned “with the formulation of a general natural philosophy, an altogether more ambitious programme and, more importantly, one with very different aims, resources, and even to some extent motivation” (ibid., 146–7). The reason for this shift according to Gaukroger “is mechanism: what Descartes is concerned to provide” in the later rules is chiefly “an account of how our perceptual image of a mechanistic world is formed, and how the process by which this perceptual image is constructed can itself be accounted for in mechanistic terms.” Descartes was of course already mechanistically biased before he set out on his project of the *Rules*, but according to Gaukroger this “was something quite different from what was being envisaged here in the later *Rules*,” (ibid., 146) as his earlier concern with mechanism engaged with the explanation of individual problems rather than the problem of a comprehensive and elementary philosophy of nature.

If one considers the *Rules*’ interest under narrow confines as being concerned with either methodological or mechanistic questions, the involvement with mechanism in the second compositional phase differs indeed significantly from the earlier rules. Whereas the early *Rules* are almost exclusively concerned with methodological questions, the later *Rules* turn to expounding a much more intricate mechanistic theory of the world. However, the *Compendium* as well as the grand ambitions Descartes reveals in his letter to Beeckman from 1619 suggest that Descartes already had a grander vision in mind when he conceived the first eleven rules. He indeed aims at deciphering the world, albeit being convinced that the corporeal world in its essence really is structured according to mathematical-mechanistic principles. The early rules confirm this concern and provide a



theoretical, methodological foundation for such an epistemological project. Rule Twelve continues in this wake by developing a comprehensive natural-philosophical account of cognition. While this can be read as a shift in Descartes' interests and concerns, there is no reason why he could not have had the same direction in mind when he put the manuscript aside after having finished composition of the first eleven rules, but lacked the conceptual and intellectual resources and means to continue with the project at this time. Particularly the subject matter of Rule Twelve is already marked out by the first eleven rules. Because he was unequivocally convinced of the mechanistic essence of corporeal objects, including the human body, he naturally drew up a mechanistic conception of perception that corresponded well with his image-based idea of cognition that he set out in the early rules. The second compositional phase corresponded with this trajectory by providing a psycho-physiological legitimation for the early rules' theoretical claims (Rule Twelve) and further methodological explorations (rules Thirteen to Twenty-One), and takes the project beyond the mere theoretical level.

The interruption of his work on the *Rules* thus suggests that Descartes had difficulties substantiating and applying his theoretical framework, or "simple propositions" (50) as he refers to the content of the first twelve rules, to the examination of given problems. Considering the foundations Descartes develops in the first eleven rules for truth, a more thorough study of optics and mathematics seems obvious to acquire the necessary knowledge to move his project further ahead. Arithmetic and geometry are the only sciences that comply with Descartes' criterion for certain knowledge, as their subject matter is absolutely clear and compelling, qualifying them as the most reliable knowledge available. Any understanding of the

world hence has to rely on them. At the same time, Descartes' concept for true cognition relies on the convincing power of explanations we grasp spontaneously in an instant. Although Descartes' model for these explanations involves any form of representation of a given problem that can be comprehended spontaneously and instantaneously, two-dimensional geometrical figures, lines and areas, as well as the analyses of antique geometers provide the ideal of such representations for him. (Gaukroger 1995, 124–5; Olscamp 2001a, xvi–xvii) Thus, the question that imposes itself is how to interrelate these two and how we can account for our cognition of corporeal objects in terms of such clear and distinct imagery.

Descartes' discoveries during the two compositional phases provide consistent intellectual concepts for solving these questions. Gaukroger (1995, 139–41, here 130) shows compellingly that during these intermittent times Descartes discovered the mathematical solution to “solid problems of the third and fourth degree by means of a circle and a parabola” and the discovery of the law of refraction. The central technique for the former was “geometrical tinkering guided by simple algebraic analysis” which let Descartes realise “that algebra and geometry move hand in hand in the invention and specification of ever more complex constructions” (Schuster 1982, 1:145–6). The law of refraction obviously relates to the question of how external objects could be perceived in the human mind, providing a mechanistic theory of image transmission via light and its refraction at the lens of the human eye. Considered together, they explore the production and recognition of clear and distinct ideas of external, corporeal objects inside the mind. As a consequence, Descartes' work between the *Rules'* compositional phases can be considered on the one hand as an examination of what provides clear and distinct images and how it

might be possible to grasp objects through the transmission of light and thus their reproduction through images in the mind. On the other, Descartes analyses during this time the connection between mathematics as mode of thinking and geometry as mode of image-representation. Rather than being foremost occupied with mathematics or optics, then, Descartes seems interested in what provides us with clear and distinct images of objects, and how this quality of objects does so – and thus epistemological questions of devising a philosophy of nature.

The further development of the *Rules* after Descartes' return to the manuscript, and the reappearance of these motifs in the second set of rules support this assumption. Helping us to "prepare our cognitive powers for a more distinct intuition of any given object and for a more discerning examination of it," (50) the first eleven rules deal exclusively with processes pertaining to the mind and its ability to detect first principles or simple natures, and hence the mental prerequisites to nature's disenchantment (cf. Clarke 2006, 87). They turn the project inwards by establishing theoretical foundations for deciphering the world through discussing the philosophical foundations of knowledge and truth, and by preparing the mind for this task in separation from any particular questions, problems or objects. Descartes' return to the manuscript during the year 1626 sees a reconfiguration of these earlier foundations, in which the "distinctive core idea of vivid and palpable representation becomes the basis for an elaborate theory of cognition" (Gaukroger 1995, 153) alongside an exploration of algebra as a representational problem-solving tool on the ground of this theory. What Descartes is now trying to establish is a compelling account of how and by what extended means we can arrive at a reliable understanding of the corporeal world, legitimated through his doctrine of clear and

distinct cognition. His venture “is no longer simply a question of studying the nature of the understanding and the faculties which aid the understanding ... , but of complementing this with a study of the ‘objects’ proper to each of these faculties” (ibid., 157). From the mental conditions of cognition, Descartes now moves on to the objective matter cognition is directed at. His treatment of matter translates to an application of his methodological consideration to the solving of particular questions and problems.

This re-orientation is not as surprising as Gaukroger suggests, especially if we consider that what Descartes is concerned with in the Twelfth Rule, which picks up where he left the *Rules* five years earlier, “is an account of how we arrive at knowledge by means of sense perception” (Gaukroger 1995, 158–9). In fact, this direction is already implied by the early rules and the larger aim of the project. As elaborated in Rule One, Descartes intends to provide with the project a guide for the systematic compilation of certain knowledge of the world. Bearing in mind this general aim, the first eleven rules account for the principle possibility of indubitable knowledge and the subject’s access to certain truth. But this leaves open questions regarding the quality of the connection between the rational subject’s intellectual realm and the corporeal world. More precisely, it leaves open the questions how we can access the corporeal world and utilise Descartes’ criterion for truth for the comprehension of particular objects; an ambiguity which weighs especially heavily considering that Descartes excludes experience as a reliable form for knowledge production. Correspondingly, it is exactly this problem of acquiring a reliable idea of corporeality to which Descartes turns in the second compositional phase, and which

he approaches by providing a theory of cognition and by devising mathematics as a methodical means to aid cognition.

Resuming the treatise, Rule Twelve “sums up everything that has been said” in the eleven preceding rules, “and sets out a general lesson, the details of which remain to be explained as follows” (39). It provides the hinge between the early and the late rules, reinforcing the theoretical claims of the first eleven rules and completing them with an analysis of the cognitive process in respect to the relationship between subject and object, while simultaneously preparing the world’s unequivocal, mathematical registering. Summarising the properties of the two sides involved in the cognitive process, Descartes elaborates that

where knowledge of things is concerned, only two factors need to be considered: ourselves, the knowing subjects, and the things which are the objects of knowledge. As for ourselves, there are only four faculties which we can use for this purpose, *viz.* intellect, imagination, sense-perception and memory. ... As for the objects of knowledge, it is enough if we examine the following three questions: What presents itself to us spontaneously? How can one thing be known on the basis of something else? What conclusions can be drawn from each of these? This seems to me to be a complete enumeration and to omit nothing which is within the range of human endeavour. (39)

The rule now lengthily elaborates on these different factors of the cognitive process and how the subject is capable of establishing knowledge of things. Although sceptical of the truthfulness of experience, Descartes first acknowledges the subject’s principal reliance on experience for the production of knowledge of things by beginning his explanation with an account of sense-perception. Our awareness of external things, according to Descartes, occurs in the way that any given object impresses its shape onto the senses’ surface, altering the external shape of the sense organs. “Secondly, when an external sense organ is stimulated by an object, the figure which it receives is conveyed at one and the same moment to another part of the body known as the

‘common’ sense” (41). In there, the figures arrive “pure and without body” (41) as ideas, and are further disseminated into two directions, although Descartes uses the terms figure and idea inconsistently and interchangeably. The first recipient is, stimulated without any reliance on reason, the corporeal imagination, which is responsible for bodily movements through moving the nerves according to the figures mediated from the external senses (41–2). Simultaneously, the figures or ideas are transmitted into our purely spiritual, incorporeal “cognitive power,” “through which we know things in the strict sense” (42) and of which purely corporeal things are devoid. The corporeal and spiritual imagination correspond in form of the superimposition of geometrical and arithmetic representations from the earlier rules, and the concept reflects his investigations in geometrical optics. Additionally to receiving figures from the common sense in the same manner the corporeal imagination does, our cognitive power can actively send figures either preserved in the memory or newly formed to the corporeal imagination to either block the reception of figures from the common sense or induce motions, thus interfering with the unconscious automatism of corporeality.

Although these pure and disembodied ideas or figures appear to be truthful images of the external objects of knowledge, our experience indeed can be deceptive, as Descartes explained in the first eleven rules (especially Rule Four, 15–20). In order to establish “what can be known with certainty” about the objects of knowledge and “try to see where falsity can come in, so that we may guard against it,” (43) we have to take further precautions. In accordance with Descartes’ criteria for truth unfolded in the first three rules and the means developed in rules Four to Eleven, we have to determine within our experiences of objects simple propositions about the objects

through the exercising of intuition. Whereas the first set thus is merely concerned with processes internal to the intellect, that is “everything that might in any way facilitate the exercise of reason,” (50) within the following rules Descartes moves on to applying intuition to arrive at certain knowledge of objects through mathematics, that is algebraic and geometric quantifications and representations of the objects. Resumption of the project however stalls at rules Nineteen and Twenty-One respectively, for which Descartes only provided headings and brief summaries (76).

According to Gaukroger (1995, 172–81), mathematics’ limitation as paradigmatic case of clear and distinct ideas, and thereby mathematics’ ability to function as absolute foundation and legitimation for the physical, natural sciences, made the *Rules* ultimately futile as an epistemological approach to the development of a concise philosophy of nature. In particular, a discrepancy arises

between the concern to represent the operations of arithmetic algebraically, in structural terms, and the concern to provide a vindication of arithmetical processes in terms of operations so clear and vivid that one cannot fail but assent to them. ... in the uncompleted Rules 19–21 he [Descartes] extends his account to a set of problems – problems that must be set up in terms of several equations in several unknowns – that can be dealt with algebraically but which cannot be legitimated in the way proposed: and at this very point he abandons the *Regulae*. (Ibid., 178)

Yet Descartes’ interest was not “to legitimate mathematics so much as to discover what its (unquestioned) legitimacy consisted in” as an attempt “to provide the physical sciences with the kind of legitimacy and certainty that was universally ascribed to mathematics” (ibid., 180). Whereas the *Rules*’ failure thus on the surface is ultimately and chiefly mathematical, the problem immanent to Descartes’ project was really the failure to provide natural philosophy with the certainty and unambiguity he intended. The failure of intuition and an image-based form of cognition as benchmarks for shedding true from false experiences, then, reveals another, more

subtle fracture in Descartes' hopes for providing a paradigmatic case of clear and distinct ideas for nature's identification. This rupture, however, might have more substantial consequences than just disqualifying mathematics as a foundation for certain knowledge.

While Descartes explores in the *Rules* human potentials for understanding the world, when elaborating on human cognitive processes in Rule Twelve he additionally explicates that the automated transmission of sense-stimuli "enables us to understand how all the movements of other animals can come about, even though we refuse to allow that they have any awareness of things, but merely grant them a purely corporeal imagination" (42).<sup>17</sup> Continuing that this mechanism "also enables us to understand how there occur within us all those operations which we perform without any help from reason," (42) the reason for this sudden reference to animals within his explication of human cognition merely seems to serve sharpening Descartes' concept of cognition, more pronouncedly delimiting human cognition from the corporeal imagination of animals. But in fact, Descartes proves rather hesitant in providing a clear answer to the question whether his account of the animation of animals is to be conceived as some form of cognition or not:

Although he tells us that the process he is describing occurs in animals, where we do not allow any cognition or knowledge (*cognitio*), he immediately appears to qualify this in telling us that, in introducing the intellect, he is now turning to cognition properly speaking (*per quam res propriè cognoscimus*). This suggests that the process just described is in fact a kind of cognition ... On the one hand, then, Descartes does not appear to be denying that there is some kind of cognition involved here; that is, he is not denying that animals have cognition; only that it is not the kind of cognition that he is interested in, namely human cognition. But, just as clearly, he cannot account for the former kind of cognition in the traditional way. If we think of the matter in traditional

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<sup>17</sup> Gaukroger (1995, 166) even translates here „cognition (*cognitio*),“ instead of awareness, further exacerbating the contradictions I am suggesting surface within Descartes' account.



terms ... then what distinguishes the two kinds of cognition is that the former involves no exercise of the intellect or will, whereas the latter does. But to say that a form of cognition which we can term corporeal cognition because it necessarily involves the exercise of corporeal organs, does not involve the intellect or the will, still leaves it with recourse to a number of faculties: memory, imagination, and even ratiocinative reasoning. Animals, who are restricted to corporeal cognition, will therefore lack a will and pure intellect, which is certainly to say that they will not be able to exercise free will or reflect upon and make judgements about their own mental processes, but he does seem to allow a sense in which they reason, for example. (Gaukroger 1995, 166–7)

Descartes' concept of cognition thus proves highly inconsistent and conflicted, and does not provide a clear boundary between human and non-human animal. Quite to the contrary, for the consistency of Descartes' project humans and animals get dangerously close to one another.

Gaukroger (1995, 167) rightly warns not to over-interpret Descartes' conceptualisation of animals at this stage, and that "it is very important that we do not start off on a wrong footing with Descartes' treatment of how the behaviour of animals ... is to be accounted for," yet there seems to be more at stake here than the apparently "illegitimate reading" of attributing to Descartes "the view that animals are like bodies deprived of the organic soul." Instead, Descartes' explicit affirmation of the mechanisation of animal behaviour in Rule Twelve points to a fundamental challenge within his epistemology and philosophy of nature.<sup>18</sup> The possibility of

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<sup>18</sup> I do not share Gaukroger's (1995, 167) conclusion about Descartes' views at the stage of the *Rules* that "animals, as well as men, reason or make inferences, but animals are prone to errors of reasoning, whereas men, because their reasoning is guided by the natural light of reason, are not." Especially, this does not seem "implicit in his comment in Rule 2 that 'none of the errors to which men – men, I say, not brutes – are liable is ever due to faulty inference' (ibid.) to me. Otherwise, it would be odd for Descartes (1985, *Notebook* [1619–21], 5) to speak of "high perfection" in animal behaviour. Rather, it strikes me to be exactly the other way round, that is, because humans have free will, they are prone to error as long as they do not guide their actions by the natural light of reason, which they alone have, whereas animals,

definitive determination of corporeality or, in more abstract terms, the identification of the objective world with concepts that leaves nothing unaccounted for outside conceptual confines, after all requires the object, empirical nature, to be certainly identifiable. Any sign of the object's erratic behaviour, as represented by a deviation from its allegedly in the minutest detail regulated patterns of behaviour, which would point to the possibility of individual interference with its behaviour, from whatever capacity stemming, has to be absent, as such would provide an incalculable element of uncertainty. Although this is allegedly an incontestable fact for Descartes: struggling on the one hand with convincingly and unambiguously conceptualising animal cognition as automatised, that is, without the particular animal to some degree partaking in its actions, his sudden reconfirmation of their purely corporeal imagination suggests on the other that the fact is not as incontestable as he claims it to be. Instead, Descartes has to reconfirm his claim over and over again. The very fact that he has to reassure its truth, however, suggests then that animal behaviour appears not self-evidentially non-voluntarily, or occurring without any freedom in the particular animal to wander off its defaulted line of action. In some way, the animal seems to defy the call for its identification.

Descartes' qualification, although merely "made in passing," (Gaukroger 1995, 167) thus reinforces the essential difference between humans and animals, but even more importantly verifies mechanism and therefore the determinability of nature against our impressions of animals. Confirming a few years later to one of his correspondents that he has "already discovered some general principles of nature, such as that there is only one material substance which receives from an external

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unable to interfere in their own cognitive processes, necessarily behave the way they do – hence they can also not be held responsible for their behaviour.

agent its action or its ability to move from one place to the another,” (to Villebressieu from summer 1631, in Descartes, 1991, 33) the problem for Descartes obviously is not that the behaviour of animals would actually provide any grounds for the assumption that they individually mediate their actions. Rather, the problem is the way people draw conclusions from witnessing animal behaviour, that is the impact of experience on cognition. After all, he stresses in Rule Twelve that considering “things in the order that corresponds to our knowledge of them, our view of them must be different from what it would be if we were speaking of them in accordance with how they exist in reality” (44). Accordingly, precisely the “high degree of perfection displayed in some of their actions makes us suspect that animals do not have free will,” (Descartes 1985, *Notebook* [1619–21], 5) rather than that such perfection would signal any self-mediation of animals, as we might be inclined to assume following our experience; hence he emphasises the automation of animal behaviour exactly inside his account of cognition, invalidating and curtailing the cognitive effect of our experience. Instead, our experience proves deceitful and has to be uprooted by measuring it against Descartes’ criteria for truth, that is clearly, distinctively and instantaneously recognisable simple nature.

But here exactly Descartes’ hopes for a decisive philosophy of nature and his criterion for truth come into conflict. Towards the end of his life, Descartes describes as follows how it came about that humans came to believe in animals’ capacity for thought:

seeing that numerous parts of the animal body are not far different from ours in external configuration and motion, and believing that in us there is but a single principle of motion, namely, the soul, which same substance moves the body and cogitates, we doubted not that just such a soul might be found in animals. (To More from 5 February 1649, in Cohen 1936, 51–2)

Our understanding of animals as self-determined therefore relies in Descartes' view on the outward resemblance of animal and human behaviour, and hence on imagery, or shapes. Grounding truth in the *Rules* within recognition of (geometrical) shapes reactivates exactly the cognitive source, the recognition of our resemblance, that has given rise to anthropomorphic projections and the belief in animal self-determination in the first place. That his preoccupation with mathematics also does not provide him with an instantly recognisable representation of a problem and its solution, seems hardly incidental. Whereas mathematics fails as paradigmatic case for clear and distinct cognition of the physical world, the reliance on experience and shapes for the conceiving of nature neither allows for the conception of an identical and therefore decisively identifiable object of nature. Descartes' departure from the *Rules* seems to answer directly to such difficulties in substantiating complete, systematic knowledge of the corporeal world, by abandoning the project of cognitive rules for devising a determinate natural philosophy in favour of actually drafting such a comprehensive philosophy of nature.

### **Natural Philosophy**

Following his dissatisfaction with mathematics, Descartes mentions to Mersenne in 1629 that he is systematically studying meteorology now (Gaukroger 1995, 180–1). As a by-product of his occupation with particularly the phenomenon of parhelia, he has “decided to write a little treatise on the topic; this will give the explanation of the colours of the rainbow ... and for all sublunary phenomena in general,” and which he intends “to publish ... as a specimen of my philosophy” (to Mersenne from 8 October

1629, 6).<sup>19</sup> Descartes' work and ambitions after the abandonment of the *Rules* therefore appear to begin relatively modestly, but grow extensively, both in respect to the project's scope and Descartes' ambitions for it. Only a month later Descartes confesses that "it will not be ready for over a year," since rising from the wreckage of the *Rules* he has "decided to explain all the phenomena of nature, that is to say, the whole of physics" (to Mersenne from 13 November 1629, 7–8) instead of occupying himself with only the one phenomenon of parhelion.

Descartes spent another four years with this project, which he refers to in letters from 1630 onwards as his *World*.<sup>20</sup> Gaukroger (1998, vii) suggests that it was "the most ambitious systematic project that Descartes ever undertook." Yet, Descartes' *World* remains rather fragmentary and incoherent. Continuously altered, expanded, reorganised and redrafted, it runs through various stages of complexity until the end of 1633, when he finally abandons the manuscript unfinished as a whole, albeit continuing to work on individual parts. According to Gaukroger (ibid., viii), it consists not only of the "Treatise on Light" and the "Treatise on Man" as often suggested, referred to as "On Light" and "On Man" hereafter, but also material on the formation of colours and on geometrical optics, while it was additionally supposed to contain a third treatise on the human rational soul. Both "On Light" and "On Man" remained unpublished during Descartes' lifetime. He eventually developed parts of the former into the essays on meteorology and optics that are part of the *Discourse and Essays*.

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<sup>19</sup> A parhelion is a bright spot of light on the ring of a solar halo, often appearing on each side of the sun. The letters and their referenced page numbers in this section are derived from Descartes (1991), unless stated otherwise. Details on the letters will only be cited in the first instance a letter is mentioned.

<sup>20</sup> Among other parts, the *World* comprises the two treatises today commonly known as *The World or Treatise on Light* and *Treatise on Man*, both of which often are referred to individually, but Gaukroger (1998) convincingly argues that they both are part of one single project.

The extant script of “On Light” is incomplete, and even though “On Man” appears complete, there are gaps in its argument and no noteworthy transition to the third part, suggesting that it also was not finished by the time Descartes stopped working on it. Adding further uncertainty about its state, he probably worked on the treatise into the last decade of his life, possibly trying to transform it into an independent piece. Finally, the projected third part on the rational soul is missing completely and according to Gaukroger (ibid., xxvi) was most likely not even drafted by the time Descartes abandoned the *World*. Due to the project’s scope and inchoateness, as well as the potentially significant alteration of its parts after renouncing the plan as a whole, the text’s consideration has to remain even more speculative and provisional than in the case of the *Rules*. However, tentatively considered within the trajectory of Descartes’ thought and oeuvre, the *World* further exposes the seemingly erratic behaviour of animated bodies as challenge for an unequivocal cognition of nature and construction of physics. In contrast to the *Rules*, the task of locating difficulties and challenges for identification can be aided by Descartes’ correspondence.

Together, the two treatises “On Light” and “On Man” contain a mechanistic theory of light and a mechanistic cosmology that rest on quantitative laws of nature and a mechanistic physiology, thereby providing a comprehensive account of a determinable nature separated into inanimate and animated corporeal objects, alongside an introduction of the physical conditions for receiving a visual picture of corporeality into our brain as prerequisite for our comprehension (cf. Gaukroger 1998). However, the details of the treatises can be set aside, since Descartes neither published nor finalised them and they hence cannot be considered to reflect a coherent position in any way. Descartes’ change in direction from epistemological to

natural-philosophical means is marked out by the *Rules'* inner tensions between providing an indubitable determinate physics on one side and his criterion for truth and mathematical epistemology on the other. In respect to hopes for providing definitive knowledge, the challenge for Descartes after the failure of the *Rules* is to convincingly establish the potential identity between corporeal objects and our (mathematical) ideas to provide the possibility for the definitive systematisation of the objects of knowledge.<sup>21</sup> Having failed to develop a clear set of rules to apply, he now takes the immediate route. Although being the aim of his philosophical efforts, natural philosophy simultaneously appears then as a tool to substantiate Descartes' hopes for the identity between ideas and objects by providing a plausible, convincing account of corporeality, since absolute dependency would eradicate any possibility for unpredictable behaviour of corporeal objects.

At the time he first announces his plan to Mersenne, Descartes is very confident about the project, liking his "present plan much better than any other I have ever had, for I think I have found a way of unfolding all my thoughts which some will find satisfying and which others will have no cause to disagree" (to Mersenne from 13 November 1629, 7f). After the failure of enlisting mathematics to provide certainty for physics, Descartes appears confident to have found a convincing proof and foundation for his project. "Throughout the correspondence of 1629 and 1630,"

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<sup>21</sup> Descartes repeatedly emphasises that recognition of the true meaning and intention of objects is reserved to God as absolute being. Whereas our ability to disenchant material nature hence has limits, these are not owing to any particular feature or activity within nature and natural corporeal objects. On the contrary, Descartes (to Villebressieu from summer 1631, in Descartes 1991, 33) explains that "there is only one material substance which receives from an external agent its action or its ability to move from one place to the another, and that from this it acquires the different shapes or modes which make it into the kind of thing we see in the primary compounds which are called elements." Instead, limited insight is owing to the restraints God has posed on human reason.

however, “his growing anxiety” about the structural organisation of the intellectual content of his treatise alongside metaphysical and theological questions he had not yet found solutions for, “sounds a counterpoint to his litany of organizational woes” (Mahoney 1979, x). Just half a year later his confidence already tones down notably and he becomes more cautious about the success of his work, informing his friend that he progresses very slowly with the treatise, because “the difficulties of physics which I told you I had taken on are all so linked and interdependent that it would be impossible for me to give the solution to one without giving the solution to all” (to Mersenne from 15 April 1630, 20). In fact, he asks Mersenne that if

anybody has the idea that I plan to write, please try to remove this impression, not to confirm it; I swear that if I had not already told people I planned to do so, so that they would say I have not been able to carry out my plan, I would never undertake the task at all. (20)

Nonetheless, Descartes remains positive that he will complete the work by early 1633, since he has discovered “the foundations of physics,” which he came across by a detour where he has also “found how to prove metaphysical truths in a manner which is more evident than the proofs of geometry” (22). Descartes is however worried that he will not be able to present it in a way that will convince others of this absolute truth. As a consequence, before revealing his proof in detail, he still wants to wait for “how my treatise on physics is received,” (22) and only “discuss a number of metaphysical topics and especially the following. The mathematical truths which you call eternal have been laid down by God and depend on him entirely” (22–3). On the one hand then, Descartes’ central hope and conviction during the early 1630s is to have established a foundation for his philosophy that will secure far-reaching acceptance of his philosophy and provide it with insistent certainty, promising to redeem the hopes that geometry and arithmetic failed to provide in the *Rules*. At the



same time, however, significant difficulties emerge that require Descartes to extend the project's scope.

Yet another half year later, Descartes has grown more cautious still about the completion of his treatise on physics, which he is now referring to as "Optics." He continues to discourage his friend from mentioning it, as he wants it "to remain unknown, for it cannot be ready for a long time because of the way I am working on it" (to Mersenne from 25 November 1630, 28). As a part of it, Descartes wants "to include a discourse explaining the nature of colours and lights," which alone "has held me up for six months and is still not half finished; but it will be longer than I thought and will contain what amounts to a complete physics" (28). Surprisingly, Descartes hopes despite the delay that this discourse "will serve to keep my promise to you to have my *World* finished in three years, because it will be more or less an abstract of it" (28). And despite the mounting difficulties Descartes seems to run into, his excitement with the work has grown so far that after its completion "I do not think I will ever bring myself to have anything else printed, at least in my lifetime. I am too much in love with the fable of my *World* to give it up" (28). Yet despite this optimism, Descartes repeats his scepticism about his ability to convince others of the solid foundation he has found for his philosophy in general and physics in particular, "which makes me know that God exists with more certainty than I know the truth of any proposition of geometry" (29). He intends his "Optics" to test "whether I am capable of explaining my conceptions and convincing others of truths of which I have convinced myself," but considering that he "doubts it very much" (29) holds out little hopes. Should this be the case,

perhaps I may some day complete a little treatise of Metaphysics, which I began when in Friesland, in which I set out principally to prove *the existence of*

*God and of our souls* when they are separated from the body, from which their immortality follows. (29, original emphasis)

In a way that contradicts Descartes' grand hopes and vows of success from the beginning of the project, the excerpts from his letters leave impressions of growing uncertainty and disorientation with his work during this early phase of the project. Descartes' attempt to explain natural phenomena requires him to gradually expand the discussion of these phenomena in range and depth. The problem is, he explains to Mersenne, that he is occupied with "one of the most important and most difficult matters I could ever undertake, for it virtually involves the whole of physics" and that there are "countless different things to consider all at once if I am to find a basis on which to give a true account without doing violence to anyone's imagination or shocking received opinion" (to Mersenne from 23 December 1630, 29). The *World*, it seems, turns increasingly into something like a being of its own that slips from Descartes' control and increasingly makes demands on Descartes. These changes in the intellectual content are accompanied by growing uncertainty regarding the argumentative rigour of his work. (Cf. Mahoney 1979, x) Thus, the project not only grows in extent, but there is also a growing uncertainty, despite the putatively certain proof Descartes has found for his philosophy. Rather than approximating his goal of a decisive natural philosophy, it seems that his early confidence is shaken the further he progresses in composing the treatise; instead of gaining ground, its completion moves further away, and the stalling continues through the following years.

At the end of 1631, Descartes informs Mersenne that because he "will try to explain what heaviness, lightness, hardness, etc. are in the two chapters that I promised to send you at the end of the year, ... I am not sending you anything about it at the moment" (to Mersenne from October or November 1631, 33). In 1632,

although claiming that the treatise “which I promised you for this Easter ... is almost finished, and I could keep my promise if I thought that you would want to hold me to the letter,” he staves off Mersenne once again “for a few months, to revise it and rewrite it, and draw some diagrams which are necessary” (to Mersenne from 5 April 1632, 36). About a month later Descartes even goes so far to assert that he has no

hope to discover the answers to my present questions about the stars. I think that the science I describe is beyond the reach of the human mind; and yet I am so foolish that I cannot help dreaming of it though I know that this will only make me waste my time as it has already done for the last two months. In that time I have made no progress with my treatise; but I will not fail to finish it before the date I told you [presumably in 1633, AK]. (To Mersenne from 10 May 1632, 38)

In June the same year he merely concedes that he has decided not to leave his current location in Deventer “until the ‘Optics’ has been completed” (to Mersenne from June 1632, 39). The erraticism and uncertainty in Descartes’ occupation with his natural philosophy resonating from his correspondence during these first two years of work on the *World* suggests that his project of drawing up a definitive physics is indeed facing significant resistance from its object.

Of course, nothing but difficulties might be expected from providing nothing less than a complete account of physics, but the problems also carry over into the physiological account of “On Man.” In 1632, Descartes informs Mersenne that for “the last month I have been trying to decide whether I should include in *The World* an account of how animals are generated. I have finally decided not to, because it would take me too long” (to Mersenne from June 1632, 39). Still his “discussion of man in *The World* will be a little fuller than I had intended,” (to Mersenne from November or December 1632, 40) despite the abdication. Quite to the contrary of solving the problems Descartes encountered with the *World*, the difficulties appear to become so

severe, that he does not even get to produce its third part by the time he abandons the project some time in 1633. Furthermore, Gaukroger (1998, xxvi) problematises, at the end of “On Man,” which describes physiology in mechanistic terms, “we might have expected the argument that the mechanical devices constructed are indistinguishable in their operations from animal physiology to have been put, and a transition made to Part III, that is, to the case of human beings,” but just these parts crucial for a determinate animal physiology and the determination of the qualitative difference between human and animal behaviour are missing.<sup>22</sup>

There is ample reason to suppose that the omissions are due to Galileo Galilei’s (1564–1642) condemnation for embracing the Copernican worldview (in his book *Dialogue Concerning the Two Chief World Systems*)<sup>23</sup> by the Roman Catholic Inquisition in 1633, which may have seen Descartes’ doubts about the positive reception of his physics fit before he finished it, aside from Descartes’ lack of interest, as a pious Christian, in coming into conflict with the Church. In November 1633, Descartes tells Mersenne that he had intended to send him the “*World* as a New Year gift, and only two weeks ago I was quite determined to send you at least a part of it, if the whole work could not be copied in time” (to Mersenne from end of November 1633, 40). However, news of Galileo’s conviction prevented him from doing so, he tells his friend. If published, Descartes’ natural-philosophical account would have been in danger of being discredited for resting on the same heliocentric rather than the ecclesiastically accepted geocentric hypothesis. Galileo’s condemnation raised the challenge of how to reliably and securely legitimate natural philosophy as a definitive

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<sup>22</sup> Descartes (1998, *World* [1629–33], 106–7) talks about the issue at the beginning of the treatise.

<sup>23</sup> Published originally 1632 in Italian as *Dialogo sopra i due massimi sistemi del mondo*.

scientific undertaking. According to Gaukroger (1995, 304), “the need for metaphysical foundations was more urgent than ever” as a consequence, and hence points to problems external to Descartes’ manuscript rather than immanent ones.

Descartes’ intellectual moves after abandoning the *World* indeed effectively and ingeniously circumvent the grounding of his physics in the heliocentric worldview, and thus seem to be a direct reaction to the discrediting of Heliocentrism, since if the view that the earth moves

is false, so too are the entire foundations of my philosophy, for it can be demonstrated from them quite clearly. And it is so closely interwoven in every part of my treatise that I could not remove it without rendering the whole work defective. (To Mersenne from end of November 1633, 41)

But it is not just the fear of persecution that troubles Descartes, as might be conjectured. Although he apologises to Mersenne for not sending his manuscript because of the danger of having to adjust it to orthodox demands, he adds that

you will perhaps be quite glad to be relieved of the trouble of reading wicked doctrines. There are already so many views in philosophy which are merely plausible and which can be maintained in debate that if my views are no more certain and cannot be approved of without controversy, I have no desire ever to publish them. (41)

Furthermore, Descartes asks Mersenne for another year to work over the treatise again. It seems therefore, that at this point Descartes, despite having decided to not publish the *World* for the time being, still planned to finish the treatise in the future. This could mean that he just wanted to properly adjust its content to not run into trouble with the Church, but this is quite unlikely as he in the same letter firmly explains that he preferred suppression to having it appear crippled (41). Only in early 1634 he makes his decision known to Mersenne that he has decided to “wholly suppress the treatise I have written and to forfeit almost all my work of the last four years,” (to Mersenne from February 1634, 42) although this decision seems to have

been not final since he tells Constantijn Huygens (1596–1687) in October 1637 that in order to devote himself to empirical studies “I have even laid aside all work on my *World*, so that I shall not be tempted to put the finishing touches to it” (to Huygens from 5 October 1637, 66). Instead, it seems more likely that Descartes’ involvement with the *World* in 1633 still contained significant weaknesses in providing a persuasive, convincing explanation for Descartes’ philosophy of nature, as he had lamented throughout his correspondence.

Indeed, the absence of the *World*’s third part alongside the missing ending to part two that prepares its transition causes significant irritations in respect to Descartes’ philosophy of nature. Whereas the crucial qualitative difference between human and animal cognition in Descartes’ account is that human “psycho-physiology ... is regulated by a mind – most importantly the ability to make judgements and exercise free will –” Gaukroger (1998, xxvi) regards the fact that Descartes does not spell out the different cognitive states consequentially “a great pity.” Exactly because of this shortcoming

we do not know much about what exactly its [the rational soul, AK] role in cognition is, but it is clear from *L’Homme* that it plays a distinctive role in human cognition. The pressing question is whether the rational soul simply takes experiences as given and reflects on them, makes judgements about them, etc.; or whether the fact that one has a rational soul completely transforms one’s experiences, so that perceptual judgements, for example, are integrated cognitive acts, not simply reducible or analysable into perceptions plus judgements. (Gaukroger 1995, 290)

The *World* breaks off just at the point where crucial questions regarding a persuasive concept of human and non-human cognition demanded answering. Considering Descartes’ continuously growing dissatisfaction as it shows in his correspondence since 1630, Descartes’ difficulties accumulate the closer he moves towards the treatment of corporeal, animated bodies and beyond to the incorporeal, rational soul,

regardless of what brought the project effectively to a standstill. The *World's* failure thus mirrors the problems identified in relation to the *Rules*, that is, that Descartes struggled with a convincing account of the externally and physically determined activity of animated bodies in demarcation of free, self-determined behaviour of humans.

Opening the *World's* first treatise "On Light," which is supposed to establish that natural phenomena can be explained sufficiently on the ground of matter and motion, with the observation that "a difference between the sensation that we have of" an object, "that is, the idea that we form of it in our imagination through the intermediary of our eyes," exists and that "what it is in the objects that produces the sensation in us, that is, what it is in the flame or in the Sun that we term 'light,'" (Descartes 1998, *World* [1629–33], 3) provides a first indication of such difficulties. Before even exposing his mechanistic theory of physics, Descartes destabilises any prevailing perceptions derived from our experience of the world. Only then does he reorganise and reconceptualise the world's structure via the example of light, and presents an imaginary account of "another, wholly new, world" (ibid., 21) based on the grounds of his just developed theory of matter and motion. In this context, however, even light is not an arbitrarily chosen example of a natural phenomenon to elaborate his mechanistic natural-philosophical conceptualisation, but, drawing on Descartes' image-based theory of access to truth, amounts to expounding the process of mediation by which we can access the true essence of corporeal objects, disenchanting the process of cognition and reducing it to a mechanical rather than emphatic affair. That he devoted one of the *World's* three parts to animated bodies, with the other two devoted to inanimate corporeality and the incorporeal human soul

in itself, further suggests that accounting for the nature of behaviour of animal bodies was proving to his overall mission both a demanding and a central endeavour. Additionally, structural and conceptual alterations in the *World* in respect to the ability of animated bodies to respond in accordance with their perceptions retrospectively substantiate further the hypothesis that plausibly accounting for automated animal behaviour posed a significant problem for Descartes' philosophy (Gaukroger 1995, 282).

Descartes' cognitive account in the *Rules* draws on the representation of shapes in humans and animals, proposing that humans have the ability to interfere actively with their own behaviour by representing shapes in their common sense through the faculty of imagination guided by reason, an ability lacking in animals. As suggested, this approach not only failed to enlist mathematics as a foundation for a certain physics (Gaukroger 1995, 284) but also to corroborate Descartes' *petitio principii* of the non-voluntary activity as a prerequisite to physical matter's definite identification. As far as the *World's* rudimentary manuscript allows us to conclude, Descartes now reworked his cognitive model from the *Rules* completely, introducing two different forms of understanding for animals and humans that rely on the same perceptual process but are of mutually exclusive cognitive quality. In the *Rules*, humans share corporal cognition with animals, to which Descartes then adds another intellectual cognition that is exclusive to the former and allows for their voluntary and wilful interference with the automated process of corporeal cognition. In the *World*, the process of perception is also shared by both, relying on mechanistic conveyance of perceptual information from external object and sensual stimulation to response, but the processes that mediate the information are traced in humans and



animals independently. Thus, “there are forms of visual understanding – visual recognition, visual discrimination – in which” all animals, including humans, “engage” (ibid., 287). Whereas nonhuman animals, however, appear to perceive, recognise and understand purely visually, allowing for a causal-mechanical explanation for both their cognition and behaviour, within human animals Descartes introduces a linguistic model in which natural phenomena are represented and recognised by natural signs which are “responsible for our sensation of light, but which is not itself light, and which does not resemble light” (ibid., 285; see also Descartes 1998, *World* [1629–33], 3–4). What Descartes attempts with this is again not to suggest that animals are devoid of any cognitive, responsive or recognisant states, but that it is possible to argue separately for a mechanistic cognition and a conscious, or reasonable cognition. However, the significant organisational as well as conceptual problems at the time Descartes quits the project suggest that his goal of an unambiguous determination of corporeality was just as impossible to reach immediately through exclusively nature-philosophical means as its justification on grounds of mathematic-methodological means proved to no avail.

During the first part of his career Descartes thus struggles noticeably to brighten the glimpses of light he had caught and mentioned to Beeckman years earlier, and which he envisaged would illuminate the darkest and most mysterious corners of the world. Moving his focus from epistemology in the *Rules* to natural philosophy in the *World* confirms the certain determination of the object nature as a central shortcoming for Descartes’ plan, and proves the mathematic-methodological guidance of cognition as an unpromising approach to pursue his aims. But he also fails to provide a plausible explanation of the non-voluntary motivation of animal

bodies, both human and nonhuman, within the *World's* philosophy of nature and thus to successfully negotiate the failures of the *Rules* in this respect. In stark contrast to the clarity with which Descartes anticipates his plan's implementation in the *Compendium* then, the object of knowledge remains stubbornly elusive during these early attempts of Descartes to renew and solidify the foundations of knowledge. This applies to his attempt of tracing the object mediated through epistemological means in the *Rules* as much as in his attempt to trace it directly through nature-philosophical means in the *World*. Moreover, the problem arises in respect to the object itself, that is, in developing a definitive theory of the world of matter, as well as in the deriving of a representation that convinces the human subject of the external and purely physical determination of the objective world. Both the individual challenges and problems of the *Rules* and *World* as well as the general trajectory of Descartes' work during these unfruitful years thus also reflect tensions between experience, cognition and the striving for definitive determination of the world, which manifest particularly in the appearance of animals as internally, rather than externally and purely physically motivated objects. Indeed, the development of his explanation of cognition is accompanied by a tendency increasingly to distance humans from animals, both conceptually as well as in respect to human somatic experience and cognition of animals themselves. The problem for the definitive identification of the world that pushes to the fore in these first projects of Descartes, both in respect to the object of knowledge as well as the knowing subject, is thus the cognitive effect our experience exercises on us, which contradicts the assumption of an identical and definitively determinable object. The fact that Descartes moves on to a metaphysical, and thus essentially theoretical approach to justify both his epistemology and philosophy of

nature in the “Discourse on Method,” corroborates the existence of immanent tensions between our experience and the world’s determination within his philosophy.

### **Severing Subject and Object**

After abandoning the *World*, Descartes continues to work for some time on his treatises on optics and meteorology individually, before eventually returning to a more integrated perspective again. In a letter to Huygens from 1635, Descartes (to Huygens from 1 November 1635, in Descartes 1991, 50) reveals “to write a preface which I intend to add to” these treatises, a plan that finally comes to fruition with the publication of the *Discourse and Essays* in 1637.<sup>24</sup> Being Descartes’ first publication, the book introduces his epistemology, provides an overall summary and extract of his prior work in natural philosophy and mathematics that particularly highlights its practical benefits, and verifies this material by an, albeit incomplete account of a metaphysical proof for certain knowledge. Its publication suggests that Descartes scaled his hurdles and finally secured the world’s disenchantment. Yet it provides only a surprisingly patchy and incomplete overview of his philosophy; its fragmented character is in stark contrasts to the vows of completeness he made earlier and thus appears a step backwards from the comprehensively coherent projects he had

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<sup>24</sup> Up to the end of 1635, Descartes had still intended to publish the “Optics” and the “Meteorology” as individual treatises.

It has become customary to refer to the *Discourse and Essays* simply as *Discourse on Method*, partially because in modern times the preface has received by far the most attention. However, Descartes himself considered the work’s preface, the actual “Discourse,” and the three essays “Optics,” “Geometry” and “Meteorology” closely related. (Olscamp 2001a, ix) To reflect the parts’ interrelation and equal status within the complete work, I refer to the full work as *Discourse and Essays*, while citing the preface as “Discourse,” and the individual essays as “Optics,” “Geometry” and “Meteorology.”

embarked on prior. Furthermore, in particular his comprehensive plan for a complete physics remains more or less absent in the *Discourse and Essays*, and he only returns to the endeavour explicitly some years later in his third publication, *Principles of Philosophy* (1644, hereafter referred to as *Principles*).

In contrast, the *Discourse and Essays* appears more like randomly assembled discussions of various philosophical topics, rather than a cohesive philosophical treatise. Its remarks on physics remain superficial and pre-empt, instead of empirically well supported; so much so that Mersenne worries that what Descartes, in the latter's paraphrase,<sup>25</sup> "says about my *Physics* may be attributed to vainglory since I do not include it" in the "Discourse" (to Mersenne from the end of May 1637, Descartes 1991, 57). Responding to calls for revealing his physics after the *Discourse and Essays*' publication, the reason for his omission is, Descartes explains, that the book "is designed entirely to prepare the way and to test the waters" for the treatise on physics, which he assures his correspondent he is still "keen to publish ... should the public desire it and I gain something from it" (to an unidentified recipient from the end of May 1637, in Descartes 1991, 58). He even explains to Mersenne that "I spoke of my *Physics* as I did solely in order to urge those who want to see it to put an end to the causes which prevent me from publishing it" (to Mersenne from end of May 1637, in *ibid.*, 57). His efforts in the *Discourse and Essays* hence signal not so much a break, or setback in the rigour and ambitions of Descartes' philosophising but an attempt to further develop the foundations he mentions in his correspondence during his work on the *World* and integrate it with his physics. Indeed, the *Principles* provide "a rewriting of *Le Monde*, an attempt to reconstruct *Le Monde* on the basis of

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<sup>25</sup> Mersenne's letters to Descartes from this period are lost (Rodis-Lewis 1998, 113).

the foundations provided in" (Gaukroger 1995, 364) the *Meditations on First Principles*, published in 1641 and 1642 respectively and hereafter referred to as *Meditations*, which again establishes "the credentials of Descartes' metaphysics, or at least to test the waters at a purely metaphysical level, before showing how his natural philosophy follows on from it" (ibid., 361-2). Whereas his involvement with metaphysics already prefigures in the growing prominence of and interest in such issues throughout his correspondence of the early 1630s, via the *Discourse and Essays* the tendencies find their culmination within the *Meditations*, and their *raison d'être* in the *Principles*.

Nevertheless, despite these restraints Descartes explains that any mistrust in his physics might arise in "people who do not know me and have read only my opening 'Discourse.' But those who look at the whole book, or who know me, will not, I think, accuse me of that vice" (to Mersenne from end of May 1637, in Descartes 1991, 57). Quite the contrary, the essays' content "could never have been discovered without" the method he introduces in the "Discourse," and he adds them precisely "so that they show how much it is worth" (to Mersenne from 27 February 1637, in Descartes 1991, 53). Although the "Discourse" shuns any comprehensive discussion and theory of physics then, the book as a whole demonstrates and rectifies the path Descartes envisions to lead to his physics – yet not more. Instead, in order to effectively level the path for his physics, the aim of the *Discourse and Essays* is to "get the public to view my method" (to an unidentified recipient from the end of May 1637, in Descartes 1991, 58) in a way that it can be applied to everything and explain every subject-matter to the degree our power of reasoning allows us to. Descartes believes that once he has achieved this "there will no longer be any need to fear that

the principles of my physics will be ill received" (ibid.). To substantiate this claim about his method, he is "not actually following the method, but trying rather to give some demonstrations of it in the three consecutive treatises appended to the 'Discourse,' where I describe it," in order to exemplify the complete knowledge Descartes claims to have obtained on their subject-matters through the deployment of his method and hence showcase the method's usefulness, while he includes "some brief remarks on metaphysics, physics and medicine in the opening discourse" to exemplify its wide applicability (ibid.). In this respect, Descartes explains to Mersenne, the book "is concerned more with practice than with theory" (to Mersenne from 27 February 1637, in Descartes 1991, 53). Although justifying his strategy in the *Discourse and Essays*, and hence within public discourse, with his intention to exemplify the power of his method to explain everything to the greatest possible extent Descartes simultaneously combats the cognitive problems which he encountered for the acceptance of his physics during his work on the *Rules and World*. The key to drawing out the "Discourse's" practical implications hence lies within considering the text in relation to the essays following it (Olscamp 2001b, vii).

Descartes' "Discourse" consists of six parts, of which the first and second discuss the qualities and attainment of knowledge, while introducing the principal foundations of his method. The third puts forward a provisional set of moral rules, while a fourth summarises the foundations of his metaphysics, which is the famous *cogito* and proof for the human soul respectively God. Descartes ends the treatise with an outlook on how to further advance his physics, which he exemplarily presented in part five, on the basis of his method, before exposing his motives for

publishing the book in part six (3).<sup>26</sup> In addition to the wide scope of material the treatise traverses, the single parts mix autobiographical elements with new philosophical elucidations as well as loosely incorporating thoughts from both the *Rules* and the *World*, and it has been suggested accordingly that the structure of the “Discourse” is incoherent and the text rather arbitrarily pulled up from different earlier writings (cf. Gadoffre 1987; Denissoff 1970). The detailed autobiography of Descartes’ life woven into the “Discourse” provides the work most convincingly with coherence (Curley 1987). Autobiography in the seventeenth century, however,

functions as a didactic genre in which lessons are implicitly contained in the story that is set out. But it is also a public exercise in self-knowledge, which for Descartes is a prerequisite both for knowledge more generally and for instruction of others, something closely connected with the idea ... that self-conviction must precede any attempt to convince others. (Gaukroger 1995, 306)

Reading the “Discourse” therefore as a narrative in the following, rather than as a particular account of actual events or just the exposition of a philosophical argument, unveils that Descartes instructs his reader practically in cognition.

In contrast to the *Rules* and the *World*, which open with methodological claims and considerations about differences in the form of our ideas and the objects they refer to respectively, Descartes chooses to commence the “Discourse” with the claim that every human being possesses the faculty of reason, that is “the power to judge correctly and to distinguish the true from the false” (4). While he thus introduces reason, or the subject’s ability to judge and evaluate, as innate standard for truth and the cognitive process as it had featured in his philosophical endeavours since the *Rules*, Descartes now establishes it as absolute reference for his philosophy, and

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<sup>26</sup> When not further specified, the referenced page numbers in this section hereafter refer to: Descartes (2001, *Discourse and Essays* [1634-7]).

hence a purely intellectual principle. To not stray from the truth, this faculty however requires proper application. Descartes suggests that he

had the good luck to have found myself, as early as my youth, upon certain paths which led me to certain considerations and maxims, from which I formed a method through which, it seems to me, I can gradually augment my understanding, and raise it, bit by bit, to the highest point which the mediocrity of my mind ... will allow. (4-5)

Before revealing this method, however, Descartes illustrates the general and far-reaching uncertainty of current knowledge, effectively destabilising the reader's belief in traditional perceptions of the world and thus preparing his canvas for a reconstruction of knowledge in new terms (6). He moves on to his criterion for truth and truthful representation of knowledge, that is clear and distinct ideas, when suggesting that those,

who are the strongest in reasoning, and the best at working over their thoughts to make them clear and intelligible, can always best persuade what they propose, even should they speak nothing but low Breton, and never have learned rhetoric. (8)

Thereby, the reader's attention is directed at clear and easily comprehensible trains of thoughts or arguments, encouraged to turn away from the chaos of arts and bewary of letters, and – mirroring the general tendency in the sixteenth and seventeenth century towards producing knowledge empirically from engaging with one's research objects, instead of acquiring knowledge of the research simply from the study of books (Ben-Chaim 2004; Gaukroger 2006; Hazard 2013) – advised to turn instead towards our perceptions of empirical objects and to trust and rely on one's own mental abilities to comprehend and judge these perceptions (9).

Continuing his destruction of the commonly accepted view on the world, Descartes carries the distrust into the traditional doctrines over into part two, in



order to emphasise the strength and superiority of people's ability to reason over other forms of cognition and understanding:

I thought that book-learning, at least that whose justification is only probable, and has no certain proof, ... does not come as close to the truth as the simple reasoning that a man of good sense can naturally make about things which he experiences. (12)

Accordingly,

as for all the opinions I had been accepting since my birth, I could do no better than to undertake, once and for all, to reject them all, in order to replace them afterwards, either with better ones, or else the same ones when I had raised them to the level of reason. (13)

Highlighting the proclaimed extensive uncertainty of the letters, he tells the reader that one can only rely on oneself, and that, in keeping with his demand for certainty, the most viable contributors to the project are logic, algebra and analysis (14–5).

From these disciplines he finally sets forth four rules of how to proceed in solving problems to guard oneself against false acquisitions: Firstly, to never accept anything as true that is not evidently known, that is to say is not known by Descartes' concept of intuition; secondly, to divide every difficulty (or object of research) examined into as many parts as possible; thirdly, to guide an examination beginning with the objects or parts that are simplest and easiest to understand and gradually proceed to the most complex, as the complex ones are composed by the simple ones; and fourthly, to make complete enumerations to not omit anything, support one's memory and improve on steps two and three of the method (16). Application of these rules improves the ability to find and recognise clear and distinct ideas through various technical analytical measures, and thereby to make better use of the natural light of reason to reach an acceptable degree of certainty about knowledge of the world (cf. Gaukroger 1995, 306).

So far, “only the mathematicians had been able to discover some demonstrations – that is, some certain and evident reasons – ” of truths, and their study holds the advantage “to accustom my mind to delight in the truth, and not to be satisfied with false reasons” (17). However, the role of mathematics in Descartes’ philosophy is in fact much more manifold and complex than to merely exemplify the level of certainty our knowledge may attain. First, Descartes’ method and therefore proof for the truth of things, that is certain knowledge of them, follows the structure of classical geometrical analysis, and thus attunes the mind to his method of scrutinising ideas for certain knowledge, as he suggests. Second, mathematical representations support his claim of the truth of clear and distinct ideas, as they are an exemplary case of clear and distinct ideas and their truth is widely accepted. Third, then, mathematical-geometrical representations are true, since they are clear and distinct. Adding to this rule of reducing every object into its parts until they cannot be reduced anymore, explains why, according to Descartes,

extension in length, breadth, and depth constitutes the nature of corporeal substance; and thought constitutes the nature of thinking substance. For everything else which can be attributed to body presupposes extension, and is only a mode [or dependency] of an extended thing; and similarly, all the properties which we find in mind are only diverse modes of thinking.  
(Descartes 1983, *Principles* [1641-4], 23-4)

But more importantly, this shows why Descartes (1984, *Meditations* [1639–42], 49) concludes in the *Meditations*, that “the whole of that corporeal nature ... is the subject-matter of pure mathematics.” Due to the true nature of mathematics, in turn, it hence follows for Descartes

that corporeal things exist. They may not all exist in a way that exactly corresponds with my sensory grasp of them, for in many cases the grasp of the senses is obscure and confused. But at least they possess all the properties which I clearly and distinctly understand, that is, all those which, viewed in

general terms, are comprised within the subject-matter of pure mathematics. (Ibid., 55)

Mathematics not only provides a practice in recognising clear and distinct ideas, it also supplies the true essence of corporeal objects, obviously advancing their determinateness. Fourth, mathematical ideas play a powerful role in Descartes mechanistic pursuit, since he “wants to provide a quantitative physics” and “nothing, literally nothing, is easier to quantify than spatial extension” (Gaukroger 1995, 368). As a consequence, mathematics not only accustoms oneself to proper thinking and truthful understanding of the world, it simultaneously prepares the restriction of matter to its geometrical physical presence and its reliable determination.

After thereby having opened up the world and traditional knowledge for renewed scrutiny and having introduced a methodical conduct for this task to rely on in order to discover certain propositions, Descartes continues in part four of the “Discourse” to subject every belief he holds to excessive, hyperbolic doubt “in order to see if after this there remained anything in my belief which was entirely indubitable” (27).<sup>27</sup> The reason for this proceeding is rather more pragmatic than actually to prove the existence of himself and objects around him, as he does not actually doubt “that there really is a world, and that human beings have bodies and so

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<sup>27</sup> In the “Discourse’s” third part Descartes sets out provisional morals, which mainly secure the social-political status quo of the time, to guide the individual until such time that one has rebuilt knowledge on thorough foundations and thereby has acquired proper guidelines to inform one’s course of actions henceforth. In an interview with the theology student Frans Burman (1628–1679) Descartes explains that he included part three “because of people like the Schoolmen; otherwise, they would have said that he was a man without any religion or faith and that he intended to use his method to subvert them,” (Descartes and Burman 1976, *Interview* [1648], 49) and thus out of pragmatic caution of authoritative disapproval on the one hand, but also to maintain his disinterested position in regard to matters of politics or even causing social unrest through his philosophy. As the arguments in this section add nothing to an understanding of Descartes’ epistemological involvement with the world, a detailed discussion proves redundant.

on – since no sane person has ever seriously doubted these things” (Descartes 1984, *Meditations* [1639–42], 11). Scrutinising every single proposition ever brought forward, however, would simply take too long. Instead, he starts his reconstruction of knowledge from the principle he can prove with absolute certainty, thereby exemplifying the strength of his method to produce certainty on the one hand, but also establishing that there is no reason to doubt the existence of metaphysical, that is immaterial, incorporeal entities, and that they exist completely separate and distinct from corporeal objects on the other. Despite his generalised rejection of any proposition, opinion and belief, Descartes however still mentions explicitly that, because our senses “sometimes deceive us, I wanted to assume that there was nothing which was such as they cause us to imagine” (27). Obviously, Descartes feels obliged to add this reference to our senses because of their centrality for acquiring knowledge in the seventeenth century in particular, but also, it appears, because of the influence they exert on people’s cognition of the world in general. Making obvious this context in particular, he thus declares in the version of the argument in the *Principles* that he distrusts the senses, although whatever “I have up till now accepted as most true I have acquired either from the senses or through the senses” (Descartes 1983, *Principles* [1641–4], 3–4).<sup>28</sup> However, distancing the process of comprehension from the influence of the senses by undermining their trustworthiness, seems at the same time also reasonable against the background of Descartes’ earlier difficulties with convincingly securing his determinable concept of corporeal objects against our (sensory) experience of animated objects as behaving erratically.

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<sup>28</sup> For the other versions of the argument, see Descartes (2001, *Discourse and Essays* [1634–7], 27; 1984, *Meditations* [1639–42], 12).

Having rejected any of his beliefs as uncertain, and in particular having made the reader wary of his or her sensory experience of the objects of knowledge, Descartes now sets out to examine his ideas to find a proposition that can be established with certainty. Rather than initially turning to the corporeal world, however, this leads Descartes first to his proof for the existence of metaphysical things, that is, Descartes' famous line 'I think, therefore I am'<sup>29</sup> alongside his proof for God's existence. Thus, the first thing he can show as certain is his own existence, simply demonstrated through his action of positing the statement that he exists. The key in this proof is, as Descartes elaborates in the second set of replies to the *Meditations*, that when "someone says 'I am thinking, therefore I am, or I exist', he does not deduce existence from thought by means of a syllogism, but recognizes it as something self-evident by a simple intuition of the mind" (Descartes 1984, *Meditations* [1639–42], 100). Later in the same set of replies Descartes further elaborates that some

perceptions are so transparently clear and at the same time so simple that we cannot ever think of them without believing them to be true. The fact that I exist so long as I am thinking, or that what is done cannot be undone, are examples of truths in respect of which we manifestly possess this kind of certainty. For we cannot doubt them unless we think of them; but we cannot think of them without at the same time believing they are true. (Ibid., 104)

Because it is undeniable that when I think, manifest in the thought 'I think,' something must be present that does the thinking, or at least the thought itself must exist, it is impossible to doubt existence of this entity.

In compliance with his rule number two, to divide any problem of his consideration into its most elementary parts, the realisation of his existence does not

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<sup>29</sup> The line appears originally, of course, in the "Discourse" in French and reads "je pense, donc je suis," whereas the renowned Latin version "cogito ergo sum" appears only four years later in the *Meditations*.

yet establish what he actually is, but at this point of Descartes' reasoning solely the fact that he truly exists. Establishing the central quality of his existence requires another analytical step. While he indeed quite easily "could pretend that I had no body, and that there was no world nor any place where I existed," maintenance of his existence becomes impossible in contrast "if I had only ceased to think, even though all the rest of what I had imagined remained true." This insight suggests then

that I was a substance whose entire essence or nature consists in thinking, and which, to exist, need have no location, nor depend on anything material. So that this *me* – that is, the soul by which I am what I am – is completely distinct from the body ... even if the body were not, the soul would not cease to be all that it is. (28, original emphasis)

Since Descartes' proof for his existence does not rely on him having a sense perception, or a body, or anything except the condition of his own thinking, this thinking existence necessarily is a thing in itself, because everything can be separated from it except that it is thinking. On the one hand, his reasoning thus establishes at this point the independent and necessary existence of incorporeal, metaphysical entities that consist in the quality of thinking and that evade detection through sense perception, a realisation that further weakens a presumed ubiquity of our senses for the production of knowledge. On the other, however, it provides him finally with a paradigm for certain knowledge because his demonstration cannot be doubted. After having established his own thinking, incorporeal existence, Descartes

considered in general what is required of a proposition in order that it be true and certain; for since I had just discovered one that I knew to be such, I thought that I should also know in what this certitude consisted. And having noted that there is nothing at all in this proposition *I think, therefore I am* which assures me that I speak the truth, except that I see very clearly that in order to think, it is necessary to be, I judged that I could accept as a general rule that the things we conceive very clearly and very distinctly are all true, but that there is some difficulty distinguishing which things we conceive distinctly. (28, original emphasis)

Aside from establishing the necessary existence of non-corporeal entities, whose certainty precedes and surmounts even the existence of corporeal entities, Descartes simultaneously raises his criterion for truth thereby beyond all doubts, since he does not define the criterion at this point so much as to deduce it from an apparent truth, which is vouched for by the natural light of reason that again guided Descartes to this first certain principle of knowledge, according to the “Discourse’s” first two parts. At the same time, however, he derives his epistemology from abstract, purely intellectual and logical reasoning and therefore legitimises it independently from corporeal objects and more importantly sensory experience and perception. With these tightly interlocking argumentative steps in the “Discourse’s” fourth part, Descartes hence detaches thinking and cognition from matter and rests it on abstract, purely intellectual foundations detached from any sensory influence.

However, because the subject is independent and cut off from the empirical world, the very structure of Descartes’ proof of the self-contained, isolated subject simultaneously posits a problem to his reasoning. While providing a paradigmatic case of the truth of clear and distinct ideas, the reasoning which led to its discovery and certainty does not allow to establish the truth of clear and distinct ideas per se. Epistemologically, it does not allow propagation of the certain existence of any corporeal and in fact any other metaphysical entities either, let alone indubitable determination of their properties – strictly speaking, the *cogito* lends certainty only to Descartes’ very own existence. Consequently, in order to rest cognitive comprehension of the world on (particular) ideas, Descartes needs a further argument to substantiate the truth of at least some of his thoughts’ content beyond his own metaphysical existence (Olscamp 2001a). This he finds in God (Gaukroger

1995, 318–20). Because he is aware of something more perfect than himself but could not have been able to form this idea on his own accord – the reason for this being that the doubts he exercises prove that he is not perfect, “because I saw clearly that it was a greater perfection to know than to doubt” (28) – the idea of perfection must have been provided to him by another more knowledgeable being. This proves to Descartes that “I was not the only being which existed ... but that it must, of necessity, be the case that there was some other more perfect being, on which I depended, and from which I had acquired all that I was” (29). Moreover, because we ourselves are flawed,

if we did not know that everything real and true within us came from a perfect and infinite being, no matter how clear and distinct our ideas were, we would have no reason to be assured that they had the perfection of being true. (32)

Since we ourselves “are not completely perfect,” (32) there would be no absolute truth within our clear and distinct ideas without certain knowledge of the existence of God.

After having established the existence of the human soul and God, and hence the truthfulness of our clear and distinct ideas, Descartes takes a third and final step to “search for other truths,” which he finds within “the object of the geometers – which I conceived as a continuous body, or a space indefinitely extended in length, breadth, and height or depth” (30). An examination of geometrical demonstrations finally reveals that the “great certainty which everyone attributes to these demonstrations” is due to “the fact that we conceive them evidently, according to the rule I just stated” (30). As a consequence, they can be considered to be absolutely true, while at the same time however they contain “nothing in them which assured me of the existence of their object” (30). While this then further supports the actual



and independent existence of metaphysical entities, as there is nothing in the geometers' object that requires the physical existence of their object, it also corroborates the truthfulness of clear and distinct ideas, due to the great certainty people generally ascribe to geometrical demonstrations. Furthermore, it prepares the way for an analysis of corporeal objects on the basis of their extension.

With the "Discourse's" fourth part, Descartes then finally embarks on providing a foundation for true knowledge of the world, after having rejected in the previous three parts all knowledge about the world, proposing a procedure to re-establish the knowledge on firm foundations and providing a preliminary set of behavioural rules. Descartes' central concern in this section is to establish "that our ideas or notions ... are real things" and, "insofar as they are clear and distinct, cannot but be true to that extent" (32). Pitching the text first against the prevailing belief that all knowledge can only be perceived from the senses or has to be in accord with our sensual experience of the world, he powerfully relativises experience as source of cognition in respect to developing a reliable philosophy of nature. Approaching the task via scrutinising the subject's existence through self-reflection and thus purely intellectually, or prior to employing cognition to sensory perception, allows to establish truths independently of any direct engagement with objects outside of the thinking self, not to mention God's ultimate undersigning of such true cognition. Consequently it is no longer our experience of the object per se that is authoritative for our knowledge about it, but only a very particular, subjectively predefined experience, although guided by a universal method to eliminate the interpretative deviations between different individual subjects. Resting truth on a predetermined spiritual procedure however, Descartes pre-emptively cuts out the risk that any actual experience gets in the way

of his proclaimed understanding of the physical world as mechanistically ordered and therefore determinable.

After thus having prepared the reader's mind and cognition to perceive the world, Descartes moves on to part five and the truths he has "deduced from these first ones," (34) that is, his physics, in the form of a brief summary of the *World*. Without revealing the actual accounts from this earlier treatise, Descartes explicates that in the *World* he had talked about the constitution of the universe, the earth and inanimate bodies and plants. The largest part of the chapter then deals with the physical composition and functioning of the animal body in order to conjure up the human body. The chapter closes with remarks that following to this discussion of the human body in the *World*, Descartes "described the rational soul, and showed that it could in no way come from the power of matter, ... but that it must be expressly created" (47). Thus, Descartes leads his discussion back to reinforcing the self-contained existence of the metaphysical subject. Yet in focussing so centrally on the mechanistic working of the body, this part of the treatise prepares animated corporeal bodies simultaneously as completely non-self-driven entity, reserving any self-drive in turn for humans. Thus he concludes the section claiming that within the human body the faculty of imagination, which changes memorised ideas creating new ones, can, by

means of distributing the animal spirits in the muscles, move the members of this body in reaction to the objects presented to these senses, and the interior passions which are in it, in as many different ways as we can make them move without using will to guide them. This will not seem at all strange to those who know how many various automata, or moving machines, the industry of man can make, using but a few pieces of machinery, in comparison to the great multitude of bones, muscles, nerves, arteries, veins, and all the other parts that are in the body of every animal; and who will consider this body as a machine which, having been made by the hands of god, is incomparably better designed,

and has in itself more admirable movements, than any of those which can be invented by men. (45)

Whereas the automata of Saint-Germain's grottoes feature in the *World's* version of the argument still just as examples for the hydraulic-mechanical nature of bodily movements, (Descartes 1998, *World* [1629–33], 107) in the "Discourse" they serve explicitly as models for animals, emphasising the purely automatised nature of their behaviour in contrast to humans. If indeed "any such machines had the organs and shape of a monkey," for example, we "would have no way of recognizing that they were not of the same nature as these animals" (45). While if in turn they "had a resemblance to our bodies, and imitated our actions as much as would be morally possible, we would always have two very certain means of recognizing that this did not make them" (45) human: their lack of intelligible speech and that even though they would perform "many things as well as, or perhaps better than any of us, they would inevitably fail in others" (46).

Animals thus continue to surface within Descartes' attempt to reiterate the fundamental separation between free and therefore indeterminate humans, and automated and therefore determinate animals. Especially his latter point, however, reveals the intellectually constructive rather than empirically deductive character of his claim and comparison. Even if the failure of animals in performing a great many acts would mean "that they did not act through understanding, but only through the disposition of their organs," (46) this proves little in terms of them actually being machine-like, considering the many things humans fail at – not the least, in Descartes' opinion, using their reason. Indeed, the human ability to fail at things proved the exact opposite for Descartes (1985, *Notebook* [1619–21], 5; 1985, *Rules* [1619–28], 12) before: that humans, unlike animals, command free will which lets them err if

they do not use their reason properly. His explanation that “reason is a universal instrument which can be used in all kinds of encounters,” whereas the organs of the animal machine “need a certain particular disposition for each particular action,” from which “follows that it is morally impossible for a machine to have enough different organs for it to act in all occurrences of life, in the same way that our reason causes us to act” (46) fares little to substantiate his claim. Because machines prove to be machines, not by any means do animals prove machines. His argument remains utterly overstretched and circular, restricted to the gear wheels of machines, not animals in flesh and blood. When he claims that “many animals ... demonstrate more industry in certain of their actions than we do, we can nevertheless see that these same animals do not demonstrate any at all in many others,” hence that their partial supremacy would “not prove that they have minds; for on this account, they would be more reasonable than any of us, and would be better in everything,” (47) his argument finally precipitates upon itself. Since in turn humans similarly demonstrate superiority only in some actions while displaying less skill than animals in other activities, neither disproves that animals have minds. Thus, his concept remains hypothetical at best. On the one hand, then, Descartes’ claim reveals the ideological character of his view on animal automatism. On the other, however, turning to animals to support his suggestion that movement and reaction do not require any intentionality, further substantiates the claim that experience of animated corporeal bodies in particular contradicted Descartes’ deterministic claims about nature and hence demands particular reconfirmation.<sup>30</sup>

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<sup>30</sup> Part six concludes the “Discourse” with an explication of Descartes’ motives to publish the treatise, highlighting the general benefits of his method and science, and problematising the obstacles that arise for it, which are the amount of experiments

Considered from a literary perspective then, the “Discourse” successively destabilises the reader’s trust in commonly accepted knowledge and understanding of the world, before suggesting an approach to the reconstitution of knowledge that overcomes any uncertainty in our knowledge and that highlights the mathematical essence of nature. Finally, the text then exemplarily reconfigures our understanding of the world in Descartes’ particular, strictly dualistic concept of an incorporeal, metaphysical, thinking (*res cogitans*) completely distinguished and separated from the corporeal, physical and extended realm (*res extensa*). He pursues this programme through the application of a very strong, convincing and comprehensible reasoning that operates via the self-scrutinising of the subject and thus in separation from corporeal objects. Respecting the sequence of the single parts, the key for the reconfiguration of the perception of the world is the uncoupling of the element of empirical, sensory experience in our understanding of the world by initially only considering mental perceptions and subjecting them to the scrutinising of his mathematically advised method. Thereby, Descartes disciplines the subject’s comprehension for their interaction with corporeal research objects. Having introduced his reasoning to lift human knowledge into the sphere of certain truths and prepared the subject mentally for the examination of nature, Descartes finally turns to exemplifying the benefits of his method at concrete matters in the three essays attached to the “Discourse.”

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that will need to be conducted to complete a systematic knowledge base of the physical world. Additionally, it links the “Discourse” with the three following essays. A detailed analysis of this part is redundant as its main point in relation to my argument is the general reaffirming of his approach to nature research by emphasising its usefulness, in particular for medical application, alongside a rather global encouragement of his readers to take up practical research, highlighting generally the “Discourse’s” role in preparing and specifically attuning cognition for empirical research.

In the first one, "Optics," Descartes sets down a theory of the physical nature of light and of geometrical optics, which lets Gaukroger (1995, 296) consider it "above all a practical treatise, designed to show how optical instruments are to be constructed," and in particular how lenses are to be produced. Whereas this is certainly the issue on which the "Optics" terminates, Descartes' regard for the topic is far from negligible within the context of his wider oeuvre. While Descartes explains that the new invention of the telescope already had carried "our vision much further than our forebears could normally extend their imagination, these telescopes seem to have opened the way for us to attain a knowledge of nature much greater and more perfect than they possessed" (152). Descartes, however, does not want to lift his eyes to the heavens. He focuses his treatise on the construction of telescopes with convex lenses, which can be used to examine in greater detail objects accessible to the senses, rather than concave lenses, which during his time are already commonly used in telescopes to study objects that are physically inaccessible, such as planets. While at first the use of the former

is not as attractive as that of those others (which seem to promise to lift us into the heavens and to show us, there on the planets, bodies that are as unique and perhaps as diverse as those we see on the earth), I nevertheless judge them much more useful, because by means of them we will be able to see the diverse mixtures and arrangements of the small particles which compose the animals and plants, and perhaps also the other bodies which surround us, and thereby derive great advantage in order to arrive at the knowledge of their nature. (172)

Reducing the "Optics" to a chiefly technical treatise runs the risk of blurring those of its epistemological connotations that correspond with the "Discourse." Not only does it exemplify the usefulness of Descartes' method, both in obtaining exhaustive knowledge of any given topic as well as in respect to the very concrete practical benefits – it also subliminally underscores the "Discourse's" cognitive and

philosophical implications and claims. Although it is a technical treatise that terminates in the grinding of lenses, the complete text indeed considers the topic of optics as a whole, spanning an explanation of light and its behaviour, (discourses one and two) via the eye as an optical lens that refracts light (third discourse) and an excursion about the senses in general (discourse four) to the resemblance of the objects in the mind, (discourses five and six) before finally reaching the construction and improvement of telescopes and their lenses to perfect our perception and cognition (seventh to tenth discourse). As such, it incorporates into its consideration of optics a cognitive account of how objects are transmitted into the mind and examines ways to improve, but also mechanise this transmission. The act of perception is explicated as a technical, rather than cognitive procedure. Notably, an important element of this appears in emphasising that nothing would be in the objects beyond what we can see while at the same time our understanding of the objects and their actual qualities need not resemble our visual experience of them. Against our experience of the objects as behaving erratically and therefore nonidentical, natural bodies are reconfirmed and conceptually secured as “made from nothing but the parts of the elements, differently mingled together,” (172) which is crucial to his project of decisive knowledge of nature.

Hence, Descartes opens his account of optics by establishing light as an “action” or property that transmits sensation of objects to us, without the need “that there is anything in these objects which is similar to the ideas or the sensations that we have of them” (68). This insight dispenses with the idea of “all those small images flitting through the air, called *intentional species*, which worry the imagination of the Philosophers so much” (68, original emphasis) and which we might imagine to be

parts, if not immediately visible ones, within and of the objects. The automated, mechanical quality of the process of sight becomes particularly obvious, when Descartes declares that the cause for the sensation of sight “is nothing other than light,” no matter if it stems from the eye, as in “those who can see during the darkness of the night, such as cats, in whose eyes this action is found,” or the object itself, “as for the ordinary man, he sees only by the action which comes from the objects” (68). Because light is an action in itself and the only action responsible for sight, consequentially perception does not in fact require any activity within or from the individual, since even if it is an action that originates within the body, as for example, Descartes explains, in a cat’s ability to see in the dark, it merely resides within their eyes, and is not an action they control. Moreover, Descartes claims that the images of objects in our brain need not resemble the object in every single detail “ – for otherwise there would be no distinction between the object and its image – ” (90) but that a few features are sufficient for us to recognise it. Consequently, the question of knowing the qualities of an object does not rely on the resemblance of the image of the object in our brain but on how the images of objects transmitted into our brain “can enable the mind to perceive all the diverse qualities of the objects to which they refer” (90). Although engravings, for example, “being made of nothing but a little ink placed here and there on the paper, represent to us forests, towns, people, and even battles and storms” (90). Yet “only in shape is there actually any resemblance” (90) between the object and our understanding of the scenes depicted. “In order to perceive,” Descartes concludes, “the mind need not contemplate any images resembling the things that it senses” (91). Hence, it is the mind rather than vision that provides depth to our perception, and more importantly, it is not any resemblance to



the actual objects that makes us understand and penetrate the objects of our perception. Whereas perception hence occurs purely mechanically and independently from our understanding, on the one hand a gap opens up between our qualitative understanding of the objects and their physical appearance, while on the other our perception of the objects is reduced to geometrical forms and the bodies' extension, diminishing any potential for cognitive comportment that attempts to understand the objects of knowledge on the grounds of their own terms and our sensory experience.

Descartes' separation of the cognitive process into a mechanistic perception and a completely different intellectual understanding comes into full play in respect to the mechanisation of corporeal objects in the "Optic's" sixth discourse. While indeed the picture we receive into our brain through the sensation of sight

always retains some resemblance to the objects from which it proceeds, nevertheless, as I have already shown, we must not hold that it is by means of this resemblance that the picture causes us to perceive the objects, as if there were yet other eyes in our brain with which we could apprehend it; but rather, that it is the movements of which the picture is composed which, acting immediately on our mind inasmuch as it is united to our body, are so established by nature as to make it have such perceptions. (101)

Whereas thus even the incitement of ideas within our brain relies solely on automated, mechanical procedures that are determined by physical compositions (cf. 100), due to this process of perception "all the qualities that we apprehend in the objects of sight can be reduced to six principle ones, which are: light, color, location, distance, size, and shape" (101). And even though "the force of the movements in the areas of the brain where the small fibers of the optic nerves originate cause it to perceive light; and the character of these movements cause it to have the perception of color," Descartes assures his readers that "in all this, there need be no resemblance between the ideas that the mind conceives and the movements which cause the

ideas" (101). With these arguments, Descartes cements the reduction of our perception of corporeal objects to their purely physically determined appearance and the separation of their appearance from the way we conceptualise the objects, and hence explain their functioning.

By providing an account of how to more precisely grind powerful lenses in the "Optics" final three discourses, which is based on the knowledge of optics and light he claims he has derived through his method, the text finally lends weight to his method both through evincing the practical benefits of producing better telescopes while thereby also improving our ability to know nature. Yet at the same time, Descartes' general account of optics interlocks with destabilising belief in the self-drive of natural objects by explicitly substantiating corporeality's essence in physical extension through his theory of cognition that appears embedded into his theory of optics, and which indeed exceeds the confines of the topic of optics. The essay thus substantiates the separation of knowing subject and object of knowledge. It simultaneously accustoms the knowing subject to perceive its objects of knowledge as purely physical and hence calculable entities, no matter what our visual experience may suggest, through a mechanistic concept of perception completely distinguished from the act of understanding.

The second essay "Geometry" moves on to demonstrate Descartes' achievements in algebra and geometry. Rather than a coherent text, it is patched together from earlier pieces of writings. Gaukroger (1995, 299) ascribes this to the fact that Descartes "no longer had much active research interest in" the topics dealt with in the treatise, "and given the intrinsic difficulty of the material, it would have been a considerable effort to master it again and set it out afresh." From this perspective, the

essay mainly appears as a voluntary exercise, maybe because he “feared that Fermat,” who had also grasped the fundamental principles of analytical geometry, “would beat him into print, and take credit for something in an area in which Descartes believed he had nothing to learn from anybody” (ibid.). Yet again, the “Geometry,” just as the “Optics,” fulfils also a specific cognitive purpose. Gaukroger gives as main purpose of its Book I “to present a new algebraic means of solving geometrical problems by making use of arithmetical procedures and vice versa” (ibid., 299–300). Descartes, however, claims as reason for its inclusion that it has “the advantage of cultivating your mind by training yourself in it, which is, in my opinion, the principal advantage we can derive from” (180) the arithmetically refined geometry and algebra it presents. The benefit we receive from such training is “that in solving these equations, provided that we do not fail to use division whenever possible, we will infallibly reach the simplest terms to which the problem can be reduced” (180). Descartes introduces geometry hence as topic to exercise one’s mind, in particular with regard to better accustoming oneself to fulfil the second rule of his method from the “Discourse,” to separate each problem into as many parts as possible, but also in preparation for rules three and four, which require the ability to think systematically in enumerations (cf. 16). Training our mind in arithmetically refined geometry and algebra hence improves our mind’s ability to trace distinct and clear ideas. With Book II linking his mathematical considerations with optics, particularly the determination of anaclastic curves and ovals, geometry also provides the methodological background and analytical approach to calculating the shapes of lenses for his treatment of lens-grinding in the “Optics,” thereby closely interconnecting the essays and highlighting the coherence of the whole book, rather than perceiving it as four

only superficially connected texts. Additionally, the mathematical essence of the “Geometry” of course promotes the quantitative and hence determinable understanding of corporeal objects. The “Geometry” thus amounts to an exemplification of the power and usefulness of his method, as he introduces his comprehensive understanding of geometry as well as relating it to grinding lenses, something for which he has already shown its practical usefulness, but also to an exercise that accustoms and trains the mind to this approach, or infer objects on the ground of Descartes’ epistemology and quantitative physics.

The third essay “Meteorology” finally consists of ten individual discourses, in which Descartes successively develops an account of meteorological processes on the basis of a model of particles and their movements, starting from a general account of the nature of terrestrial bodies. Of all the essays, this one would have served best as a textbook, but the area was also “a good one for mechanism to show its mettle” (Gaukroger 1995, 295). It provides a vivid account of an alternative to Aristotelian meteorology as well as a “model of how to do quantitative mechanist natural philosophy,” (ibid., 296) and it thus supports Descartes’ efforts towards a decisive philosophy of nature and physics most directly. Some of the topics Descartes directly engages with in his “Meteorology,” “parhelia, along with rainbows, halos, and various streaks or columns of light collectively referred to as *virgae*, ... had been recognized since antiquity, and had commonly been thought to be of use in forecasting the weather” (ibid., 217). Not surprisingly, Descartes devoted the discourses seven to ten and thus almost half the “Meteorology” to such phenomena. An important immediate benefit of these efforts is for Descartes to

be better able to determine in general what winds must be the most frequent and the strongest, and in what areas and seasons they must prevail, if we take

precise notice of all the things which have been noted here. And we will be still better able to determine it for the great seas, especially in places far removed from land. (296)

In a time of heavy imperialist expansion of European powers via an exploration of the seas which relied on sailing and thus on wind as propelling force, the usefulness of knowledge about their occurrences cannot be overestimated, and the “Meteorology” thereby highlights palpably the entanglement of Descartes’ efforts in epistemology and natural philosophy with not only the enlargement of human powers over nature, but also the advancement of early capitalism’s grasp in the world (cf. Oestigaard 2013; Scammell 1997). Indeed, inspired by his friend Beeckman, Descartes had thought in seafaring terms as early as 1619:

After I left Middelburg I reflected also on your art of navigation, and in fact discovered a method that would enable me to work out, simply by observing the stars, how many degrees east or west I had travelled from some place I knew, no matter where on earth it might be ... I rather think it has been neglected because of the difficulty of applying it ... But if that is the only drawback with it, I would be very surprised if sailors thought it such a useless discovery. (To Beeckman from 26 March 1619, in Descartes 1991, 3)

But just as in the other two essays, at the same time the “Meteorology” shows what cognitive challenges a decisive and exhaustive natural philosophy is up against and what Descartes sets against these challenges. Clouds, he laments for example, were imagined

to be so high that poets and painters even fashion them into God’s throne, and picture Him there, using His own hands to open and close the doors of the winds, to sprinkle the dew upon the flowers, and to hurl the lightning against the rocks. (263)

On the one hand reflecting contempt for the profaning of God through His pictorial representation, Descartes hopes on the other “that if I here explain the nature of clouds, in such a way that we will no longer have occasion to wonder at anything that can be seen of them, or anything that descends from them,” this will lastingly counter

such superstition, and make people “easily believe that it is similarly possible to find the causes of everything that is most admirable above the earth,” (263) hence preparing the acceptance of a fully determinable corporeal world.

Consequently, what Descartes identifies at the heart of the challenge as well as what he prescribes as countermeasures far exceeds mere superstition. Nothing is to remain obscure within the phenomena; they are to be identified without anything remaining unaccounted for. Through this, not only unfounded superstition but any element of wonder or surprise is to be overcome, achieved through the phenomena’s disenchantment through orderly explanation. Thus Descartes “contents myself to deal in a few words with all the causes which seem to me capable of producing” comets, the explanations of which “are usually falsified and augmented by superstition and ignorance,” and which “give idle people cause to imagine squadrons of ghosts who battle in the air, to whom they prophesy loss or victory for a particular group they admire, according to whether fear or hope predominates in their fancy” (330–1). For this to be possible, however, Descartes must reject anything potentially incalculable and indeterminable in the objects that could be the source of such astonishment. Within Descartes’ preoccupation with meteorological questions therefore surfaces not only the perspective of a mechanistic natural philosophy and the benefits of his method to produce such, but also the challenge of convincing people of the unequivocal and comprehensive determination of the objects of knowledge. Descartes’ “Meteorology” is as much a sample of his physics as a countermeasure to the common idea of a natural world that would be self-motivated.

The three essays attached to the “Discourse” therefore not only exemplify the usefulness of Descartes’ method by providing discussions of the topics they engage

with and pointing out the practical scope of his findings. Simultaneously, they also work towards delegitimising traditional belief of the self-motivation of corporeal objects and trust in knowledge formed through sensory, somatic experience, and hence weaken the impact of our immediate experience on our comprehension of the corporeal world. Central to this effort is the reader's instruction in Descartes' method of cognition and thinking: the first essay schools the reader in specifically conceptualising and practically enhancing certain cognitive abilities, the second in practising our cognitive abilities according to a particular model and the final one in exemplifying the plausibility and incredible practicality of his method. Rather than a mere display of some of Descartes' insights, and therefore a stock taking of his philosophy to date, or an introductory exposition of his epistemology or philosophy of nature, the complete *Discourse and Essays* maintains coherence through challenging and attempting to change the way of comprehending the objective world. Within this framework, Descartes' reasoning and method reach significantly deeper than paving the path to consistent truths. Instead, the book's structure gradually accustoms the reader to actively sever his or her thought processes from empirical contact with the object, thereby disciplining cognition and the subject's cognitive engagement with the object itself. Thus, when challenged in a letter that it were "obvious that the behaviour of animals is driven by a principle that is more excellent than merely being compelled to act by the state of their organs," (Pollot to Descartes via Renieri from February 1638, in Bennett 2013, 58)<sup>31</sup> Descartes replies that the problem with overcoming this belief would be that

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<sup>31</sup> Alphonse Pollot's (1602–1668) complete question reads: "We see that the beasts make their attitudes and passions known through their sort of language: they have many signs showing their anger, fear, love, sorrow, regret at having acted badly.... It's

most of the actions of animals resemble ours, and throughout our lives this has given us many occasions to judge that they act by an interior principle like the one within ourselves, that is to say, by means of a soul which has feelings and passions like ours. All of us are deeply imbued with this opinion by nature. Whatever reasons there may be for denying it, it is hard to say publicly how the case stands without exposing oneself to the ridicule of children and feeble minds. But those who want to discover truth must above all distrust opinions rashly acquired in childhood. (To Pollot via Renieri from April or May 1638, in Descartes 1991, 99)

From Descartes' opinion here, the "Discourse" unfolds as less an actual proof of his method and more as a guide to thinking, while the essays feed into these instructions through unfolding a theory of cognition, exemplifying the practical usefulness of his method and therefore underscoring its truthfulness, sketching a mechanistic philosophy of nature, and (mathematically) mechanising the process of comprehension itself. Hence Descartes introduces the "Discourse" to his friend Mersenne as a text that is concerned with practice rather than theory, and the essays exemplify not the application of his method but its benefits (to Mersenne from 27 February 1637, in Descartes 1991, 53). What stands out, however, is that Descartes does not exemplify the truths of his rules in respect to the object the methodology is supposed to identify. Instead, he introduces the method of thinking independently of any particular object, and even substantiates his method not by demonstrating the correspondence of his findings with the object, but by its practical usefulness. Rather than providing the knowing subject with any decisive truths about the object of knowledge, the book as a whole trains the reader to perceive the object of knowledge in separation from its empirical appearance – above all through the separation of sensory experience and comprehension – as well as comprehending it as purely

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obvious that the behaviour of animals is driven by a principle that is more excellent than merely being compelled to act by the state of their organs. The principle I'm talking about is *instinct* – something that never occurs in a machine or in a clock, which don't have passions or attitudes as animals have."



externally and physically motivated. With this orientation, the *Discourse and Essays* answers indeed to the struggle visible throughout Descartes' work on the *Rules* and *World* for providing a convincing, certain and conclusive approach to and concept of particularly non-human animated objects – animals – as purely externally and physically regulated and hence comprehensively identifiable. During these earlier attempts, Descartes increasingly comes to identify the fact that people would trust too immediately on their experience within their reasoning as a central challenge for his philosophy of nature. Consequently, in order to plausibly support the determinateness of animated corporeal objects and therefore the complete accountability of the workings of the natural world, both within the argumentative structure of his philosophy as well as in respect to the historical intellectual atmosphere, Descartes has to restructure this process and break the connection between our experience and the conclusions we derive from them. By first isolating the knowing subject from the object of knowledge and preparing it cognitively for the task of cognition, before reengaging the subject with the object, the *Discourse and Essays* does just this, while simultaneously underwriting the distinctiveness and transcendence of the subject as well as the reduction of the object to its physical presence.

### **Consolidation**

After thus having accustomed the public to his way of thinking, Descartes follows up on the *Discourse and Essays* four years later with an elaboration of his proof of metaphysical entities in the *Meditations*. Since the latter's six meditations "read like an account of a spiritual journey in which the truth is only to be discovered by a purging, followed by a kind of rebirth," (Gaukroger 1995, 336) just as in the case of

the previous text, the *Meditations* can be considered not merely a philosophical treatise but a sort of narrated literary piece and tutorial textbook to guide and engage people in Descartes' argumentation through having to reconstruct his train of reasoning. From a metaphysical perspective, the account mainly lends additional vigour to the argument explicated in the "Discourse." The *Meditations* continues the former's discussion in a significant way, however, by systematically extending the logical arguments for the proof of metaphysical entities to the nature of corporeal things, albeit still only on a general level – an issue the "Discourse" only tentatively and diffusely indicates. Descartes spells out his argument that the objective world would amount to nothing more than its physical presence in three steps.

The first is to establish not just the existence of God but, more importantly, the transcendent nature of His existence, and thereby show that God cannot be immanent in nature. ... The second task is to establish mutual exclusivity of the mind and the body, thereby showing that mind cannot be immanent in any way in nature. The third is to establish that the corporeal world can be characterized exhaustively in geometrical terms, and that such a characterization provides one with a clear and distinct grasp of its constituents and their behaviour. (Gaukroger 1995, 338)

Gaukroger's summary of Descartes' argumentative strategy exposes the instrumental and speculative character of Descartes' epistemologically supported mechanism, as it illustrates how Descartes develops his proof not by starting from the object of knowledge, but independently from its consideration, applying the proof only subsequently to the object. Rather than carefully considering his subject-matter, which would be the qualities of the object of knowledge and the cognitive relationship between subject and object, Descartes continues to subsequently submit the object to his preconceived method. The idealistic and ideological foundations of Descartes' endeavour hence remain the same. Indeed, his attempt to keep metaphysical entities, effectively God and the human soul, separate from nature, on

the one hand helps to undermine any arguments that might be levelled against an advancement in nature's exploitation during early Modernity on the grounds of God's manifestation within nature,<sup>32</sup> thus highlighting the entanglement of Descartes' work with the progression of unlocking nature for human consumption. But on the other hand it also conforms to Descartes' hopes for total identification of the world. Just as determinateness requires the absence of individual freedom in the behaviour of the material world, including the requirement that God, after having initiated the course of the world, interferes with it only potentially rather than permanently, so requires the possibility of humans to be capable of appropriating and altering nature according to their needs the ability of humans to freely shape their own behaviour. (Cf. Letter to Mersenne from 15 April 1630, in: Descartes 1991, 22–3; 1998, *World* [1629–33], 23; 2001, *Discourse and Essays* [1634–7], 34–7; 1983, *Principles* [1641–4], 57–9, 107–8)

Logically, this provides Descartes with the challenge to secure freedom in human actions despite their ligation to a material, determinate body, as otherwise they would be tied up in the eternal machinery of corporeality, incapable of improving the world to maximise human well-being.<sup>33</sup> But at the same time, Descartes has to establish the corporeal object as exclusively determined by forces

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<sup>32</sup> Such issues reflect, for example, in Descartes' (to More from 5 February 1649, in Descartes 1991, 366) remark that his opinion of *animals as having no soul* "is not so much cruel to animals as indulgent to human beings – at least to those who are not given to the superstitions of Pythagoras – since it absolves them from the suspicion of crime when they eat or kill animals." Similar, they are present in Mersenne's attempts to establish mechanism as a countermeasure to naturalism's tendency to either deny the existence of the supernatural or mistake it for nature (cf. Gaukroger 1995, 147–8).

<sup>33</sup> Another challenge proves obviously to reconcile an idea of nature more or less absent of God with the seventeenth century's orthodox claim of God's omnipresence. However, as this is in the main part a question of theology and the solutions Descartes delivers indeed merely answer to historical conditions of faith, (Gaukroger 1995, 336–8) they can be disregarded here.

beyond its control. Descartes solves this problem by separating mind and body and reserving a free will for the human soul, while conceptually reducing bodies to calculable, geometrical properties. Having set out to prove the former in the “Discourse” and accustomed his readers mentally for considering corporeal objects as purely mechanically automated, he applies his proof now in the *Meditations* to the latter, that is, corporeal nature. (Gaukroger 1995, 338) Descartes elaborates on his argument in meditation six:

First, I know that everything which I clearly and distinctly understand is capable of being created by God so as to correspond exactly with my understanding of it. ... It follows that corporeal things exist. They may not all exist in a way that exactly corresponds with my sensory grasp of them, for in many cases the grasp of the senses is very obscure and confused. But at least they possess all the properties which I clearly and distinctly understand, that is, all those which, viewed in general terms, are comprised within the subject-matter of pure mathematics. (Descartes 1984, *Meditations* [1639–42], 54–5)

Relying on his criterion of clear and distinct ideas as the measure for truth, Descartes suggests that every clear and distinct idea represents a possible being in a way that these ideas correspond exactly with its existence. Beyond simply establishing the criterion of clear and distinct ideas, then, he predetermines that, regardless of any sensory resemblance to the empirical object, clear and distinct ideas are essentially identical with their object – there is no gap or difference between the idea of an object and its being, as long as the idea of it in our mind appears clearly and distinctly, whereas there can be clearly a difference between our perceptions and the essential being of an object. Since mathematical ideas are clear and distinct, he therefore concludes that they equal truly existing beings – and in fact his “entire physics is nothing but geometry” (to Mersenne from 27 July 1638, in Descartes 1991, 119). While corporeal beings therefore exist, or at least can be created by God, at the exact same instant Descartes proves them as also necessarily having the properties of our

clear and distinct ideas, which are those of extension, and only of extension. Having proven metaphysical entities already to be not extended, Descartes establishes in turn that corporeal objects are, of necessity, devoid of any qualities beyond their extension and therefore quantitative determination. Within the very moment that the knowing subject thus turns to scrutinising corporeality to assure itself of the existence of the outside world, and thus a potential gap in Descartes' proof opens up for sensory experiences of corporeal objects to exert their (corrupting) cognitive influence, Descartes seals this opening by establishing the existence of corporeal objects and reducing their essence to their extension in one and the same argumentative blow. Even though this does not necessarily prove the absence of a faculty that would make animated objects in some respect autonomous from external forces, Descartes powerfully curbs further the experience of the objects of knowledge that contradict his claims for their reliable and decisive identification. Devoid of any concrete discussion of physics or natural philosophy, the *Meditations* with their theoretical proof of the extendedness of corporeal objects thus provide a further step in preparing the knowing subject to conceive of the corporeal world as a mechanically automated entity against the subject's experience.

Together then, the *Discourse and Essays* and the *Meditations* gradually accustom the reader to perceiving and thinking the corporeal object of knowledge as automated entity by disciplining and incapacitating sensory experience.<sup>34</sup> The need for this holds particularly true at a time when the prevailing belief is that nature is

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<sup>34</sup> Gaukroger (1995, 291–2) suggests fear of public rejection of Descartes' philosophy due to theological disapproval of his physics. While I agree that this certainly has a strong impact on Descartes' proceeding in bringing his philosophy to public attention, I believe this analysis presses not far enough. Additionally, experience proves a challenge to Descartes' mechanistic philosophy of nature, as I show in the following.

populated by demons, spirits or souls and corporeal objects are considered to be intrinsically self-willing and -motivated. To claim the opposite could easily destroy one's reputation and authority, as Descartes (1991, 99) points out to Pollot. More importantly, the widespread trust in the self-motivation of nature and animated bodies in particular contradicts claims for their definitive determination, the central tenet of Descartes' whole project. A too hasty disclosure of his natural philosophy would have exposed Descartes to the danger that his work would have been dismissed as preposterous and naïve, without even taking the time to seriously consider, let alone properly scrutinise his arguments. Once his proof has sunk in and one is sufficiently convinced of the truth of the argument, however, experience still might contradict the theoretical claim of animal behaviour as purely determined by external and physical conditions, but now one 'knows' that these experiences are 'irrational.' By legitimating his epistemology and proving the quantitative essence of corporeal objects independently from the empirical objects, Descartes separates the legitimation for his quantitative method of cognition and physics from the actual, practical act of registering the world, preparing in the abstract the quantitative registering of the corporeal world in spite of contradictory experience. Effectively, however, this means that the subject suppresses an experience-based cognitive reflex in its interaction with empirical objects in the research process. Following Adorno, this suppressed response can be understood as aesthetic comportment or emphatic, mimetic element in the subject-object relationship. Thereby, Descartes gradually corrects the cognitive dysfunction he blamed for the contradictions between experience and the objects of identification, by disciplining the cognitive reflex that suggests the nonidentity between his mechanistically automated concept of the world

and common experience of empirical objects. Descartes thus, quite ingeniously, annuls the repercussive cognitive element in the interrelation between knowing subject and corporeal objects of knowledge. Yet, due to the strong impression that the experience of empirical objects has on human comprehension – and even more so on perception in animals – this suppressing is not a quick, simple or easy task. Rather, it is something one has to practise, in ways provided by the *Discourse and Essays* and reinforced by the *Meditations*. Epistemology, or the theorising of cognition, coincides in this proceeding with the practical act of cognition, reshaping or disciplining the very process of comprehension.

Within Descartes' move towards disciplining the subject-object relationship surfaces on the one hand an experience of the object as evading its identification by thinking, and therefore the control of the knowing subject. On the other, it reveals the tendency of the subject to push through the identifying condition of reason against the subject's experience and thus the reasoning subject's tendency assimilating the object of knowledge. Both moves are what Adorno criticizes about thinking.

Descartes' focus on the functioning of animals within his exposition of physics in the "Discourse's" fifth part seems in this respect not merely due to the promised medicinal application of his mechanical theory of the body, which undoubtedly was Descartes' main consideration when choosing this topic as specimen of his physics, but also because additionally, animals appear to be corporeal objects that are particularly challenging to conceive as purely externally motivated and regulated. So much so, in fact, that when he voices in the "Optics" his view that the "total nature and essence" of natural bodies "consists in nothing but the weight, shape, arrangement and movements of their parts," he cautions his claim by suggesting that this is true "at

least of those that are inanimate" (172). This makes the animal both *pars pro toto* example as well as the one that most begs explanation in order to support Descartes' claim that the corporeal world is restricted to its physical presence, completely regulated and essentially different from our sensory impression of it. However, within Descartes' qualification also resonates doubt or at least significant difficulties about the certainty of his mechanistic physics in respect to animated bodies. Thus, still in 1643 Descartes writes to a correspondent that "I do not remember having written that motion is the soul of animals; indeed I have not publicly revealed my views on the topic" (to van Buitendijck from 1643, in Descartes 1991, 230).<sup>35</sup> These difficulties indeed prove unresolved throughout the last years of his career.

## Loose Ends

With the publication of the *Meditations* complete and finally setting out to publish a comprehensive account of his philosophy that integrates his metaphysics and epistemology with his physics and natural philosophy in the *Principles of Philosophy*, Descartes enters into the concluding phase of his career. In respect to public acceptance of his physics, his preparations – the gradual disclosure of the foundations of his philosophy alongside his legitimating metaphysical account – seem to have been successful as the *Principles* "was not put on the Index (or at least not for twenty years), which was quite an achievement, something that one cannot imagine happening in the case of" (Gaukroger 1995, 380) the *World*. Descartes had successfully prevented public slandering and allowed for dissemination of his

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<sup>35</sup> In respect to possible addressees of the letter refer to the discussion in Verbeek et al. (2003, 176).



philosophy.<sup>36</sup> Yet his ambitions towards the project nevertheless fell short by two volumes, as he had planned the *Principles* to comprise six parts but published only four.

The existing volumes cover Descartes' metaphysical epistemology as well as his account of astronomy and the earth as a system purely made up of matter and motion. The first book leads the reader via a logical scrutinising of knowledge and cognition to Descartes' physics. Being a rewriting of the *Meditations*, it establishes the viability of his physics on the ground of a few first principles, the *cogito*, the existence of God and so on, via a deductive metaphysics that establishes the credentials for his physics and legitimates it through a convincing, indubitable and mainly didactically operating structure independent from concrete questions of natural philosophy. According to Descartes (1–2),<sup>37</sup> these first truths are absolutely certain and guarantee the truth of other principles such as Descartes' physics, which in themselves cannot be proven to be absolutely certain; they require the first principles in order to reach absolute certainty. The latter are thus crucial to Descartes' project of providing certain, indubitable and decisive identification of the world. The second book extends

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<sup>36</sup> A clash over Descartes' philosophy with University of Utrecht's rector Gisbertus Voetius (1589–1676) can be traced back to an unfavourable presentation of Descartes' philosophy through Henricus Regius (1598–1679). Descartes actually had warned Regius in 1641 not to publish his treatise because he feared accusations of heresy and mended drafts of disputations composed by Regius to avoid such accusations, but eventually Regius' improvidence brought Voetius into the arena, who sharply rejected Regius' natural philosophy and obtained an official condemnation of Cartesian philosophy. However, the situation escalated particularly because Regius neglected Descartes' metaphysics. Thus, it was actually not Descartes' philosophy that caused the problem but an insufficient representation of it that missed exactly the independent proof for the alleged correctness of Descartes' mechanistic philosophy of nature, and thus its most vital part. The dispute also remained on a local level. (Cf. Clarke 2010)

<sup>37</sup> When not further specified, the referenced page numbers in this section refer to Descartes (1983, *Principles* [1641–4]).

the very brief and general discussion of material objects from the *Meditations*, while book three explicates Descartes' views on astronomy and lays out a theory of the universe. Book four turns to the composition of the Earth on its most basic, fundamental and elementary level, that is, his theory of the composition of matter from corpuscles.<sup>38</sup> Descartes then first provides the reader with an epistemological introduction to what can be considered truth and how one can produce knowledge, before establishing from these premises general principles about material objects. He then moves on to a macro-level explaining his theory of the constitution of the heavens, before finally settling into the micro-level of the composition of the earth, that is his theory of matter and its motion.

The missing two volumes, Descartes explains, would have included “a fifth concerning living things, or animals and plants; and a sixth concerning man” (275). They were supposed to elaborate how, based on the principles laid down in books one to four, we can understand the composition of animals and plants in solely mechanistic, determinate terms, and the composition of humans in so far as a human soul is joined to a human animal-body that distinguishes it from all other animated bodies. The article of the *Principles* in which Descartes explains his omission is captioned, however: “concerning those things which must be borrowed from [my projected] treatises on animals and on man, for an understanding of material things” (275, original modification). Whereas the fifth part thus would have included an explanation of plants, it appears that animals are its primary concern, or at least its primary challenge. The reason for not including them is that “all the things which I would wish to discuss in those parts have not yet been perfectly examined by me, and

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<sup>38</sup> Since these parts mainly restructure and integrate the material Descartes had composed prior to 1640 (Gaukroger 1995, 364–5), I skip a more detailed discussion.

because I do not know whether I shall have ever sufficient leisure," or time for conducting the required experiments, "to complete them" (275–6). Descartes abandons the *Principles* then just where he would have turned to identifying the functions of individual, animated empirical objects in demarcation from human behaviour. Just as in the case of the *World* before, Descartes still appears to struggle with conceptually accounting for nonhuman animals on one side of his equation and human animals on the other, despite having allegedly secured a path to certain and indubitable knowledge.

However, Descartes continues that in order not to allow "anything which I might have reserved" for the final two volumes to obscure understanding of the first four, while also not "further delaying these earlier parts," he includes "here some few things" with the *Principles* that foreshadow these treatises. Tellingly Descartes focuses on issues "concerning the objects of the senses" (276). In the following articles Descartes turns to the challenge of explaining the corporeal world beyond our perception of its extendedness and principal motion, since

up to now, I have described this Earth, and indeed this whole visible world, as a machine, considering nothing in it except figures and motions; yet our senses show us many other things, namely colors, odors, sounds, and similar things. And if I remained completely silent about these, I should seem to have omitted the principal part of the explanation of natural things. (276)

Primarily, however, the appended articles discuss in fact sensations in respect to the passions and feelings they evoke in us, thus foreshadowing the *Passions*, aside from a few more general statements defending his philosophy. His elaborations amount to an account of how we can come to an understanding of material objects on the grounds of our sensual perceptions and lead to the justification that "we perceive by our senses nothing in external objects except their figures, sizes, and movements"

(281). The challenge that becomes visible here is then not so much issues concerning the objects of our senses, rather than the way we perceive these objects through our senses and the ideas we derive from these experiences about the objects, alongside the potential control of these cognitive considerations. Whereas Descartes deals with the matter of the diverse and qualitative way in which the world presents itself to us, he answers this challenge by penning in our sensory experiences and limiting the objects to their quantitative features. In respect to the missing treatises, the appended articles thus explicate how we can rely on sensory experience only in a very limited fashion when we turn to comprehending corporeal objects, in particular animated ones, and that they are decisively and comprehensively determinable. Simultaneously, said articles are also a subsequent validation regarding Descartes' statements on physics in the *Principles*. This becomes particularly obvious when one considers that the title of the last article before his added summary of the missing two volumes, and hence the actual finish of Descartes' account of the functioning of the earth in part four, claims that "from what has been said, it is understood what the causes of all the remaining wonderful effects usually attributed to occult qualities can be" (274). The complemented articles tellingly reinforce this claim.

The content which Descartes develops in the first four books is first and foremost of logical nature, as no one would be able to physically engage with the objects of scrutiny – the metaphysical realm of his thinking substance could not be seen or felt, the heavens were too far away to conceptualise them other than by logical scrutinising and the theory of matter presents nothing one can touch or see, but only grasp intellectually, at least in the seventeenth century. In terms of constructing and conceptualising them, Descartes' theories were not challenged by

conflicting experience and thus he only had to assure that they were logical and complied with Orthodoxy, something he is exceedingly successful at. Difficulties in his account, in contrast, appear once Descartes turns to less distinctive, and qualitative aspects of particular corporeal objects of knowledge that can be experienced more directly. Descartes decides to publish therefore his conceptual, theoretical approach to the corporeal world expanded by physical models that are to a large extent withdrawn from direct experience, whereas individual objects and in particular animals, who can be experienced more directly and immediately, still remain absent from his natural philosophy. It seems therefore that even after Descartes had successfully and convincingly legitimated his physics, adequate conceptualising of animals remains a problem and he continues to struggle accounting for animal and human behaviour under mutual exclusion from each other as well as with experience.

Despite these on-going difficulties of Descartes, publishing the first four books nevertheless was by all means worthwhile from the perspective of gradually breaking resistance against his natural philosophy. After the success of his metaphysical proof, acceptance of and trust in nature's determinate and quantitative essence, as well as final, indubitable proof for it are simply questions of internalisation and obstinate abiding of his method and metaphysical epistemology, as well as time and labour. The books provide another exercise in practicing thinking according to Descartes' method – and one that was more directly accustoming people to perceiving the corporeal world in these terms, as it systematically extended the horizon of Descartes' account to the corporeal realm, while simultaneously remaining at a safe distance from objects of immediate experience. But if he really wanted to advance acceptance of his project to decipher the world through his method of cognition, Descartes also had to

affirm the possibility of the determinate explanation of corporeal objects beyond their figures and motions, despite his inability to yet adequately do so. Otherwise, the whole *Principles* would have retained the status of a bold hypothesis, which explains why he appends the concluding articles 188 to 207. Although there is no reason to doubt that Descartes began work on the *Principles* with the aim of drawing up a final, complete presentation of his philosophy then, the book eventually ends up as a further step of accustoming people to it, albeit providing much deeper systematic coherence and including physical topics much more explicitly in the text than his previous publications. Yet, Descartes still omits in the *Principles* topics that may leave the impression that natural objects would behave erratically and were therefore essentially indeterminable. While Descartes “builds up a general systematic natural philosophy from first principles, and the material is deductively arranged,” he does not claim

that the very specific physical doctrines elaborated are to be, or have been, discovered from metaphysical foundations. Rather, the function of the deductive structure of the argument is to provide a systematic metaphysically grounded natural philosophy, into which specific results which have already been discovered can be incorporated. It is a means of imposing [a] system on these results, and for most of his results Descartes claims little more than moral certainty. (Gaukroger 1995, 379)

The absence of the *Principles'* last two parts on animals and humans suggests that it proves particularly difficult to impose a system on the animal, or animated objects, in demarcation from the human soul, and thus an entity that stands for the potential of erratic behaviour. On the one hand, the *Principles* hence represents further customisation to both Descartes' epistemological concept and natural philosophy as well as the idea of the corporeal world as a mechanistic and therefore identifiable

entity. On the other, however, the project stands for Descartes' persisting inability to conceptualise animal behaviour in strictly mechanistic terms.

A paradigmatic manifestation of these problems appears in his correspondence with fellow philosopher Henry More (1614–1687). More was among the earliest Cartesians, and his receptiveness to Descartes' philosophy is without question, (Reid 2012) but even someone as devoted as he had difficulties with Descartes' view on animals.<sup>39</sup> Indeed, he

turns not with abhorrence from any of your opinions so much as from that deadly and murderous sentiment which you professed in your *Method*, whereby you snatch away, or rather withhold, life and sense from all animals, for you would never concede that they really live. Here, the gleaming rapier-edge of your genius arouses in me not so much mistrust as dread when, solicitous as to the fate of living creatures, I recognize in you not only subtle keenness, but also, as it were, the sharp and cruel blade which in one blow, so to speak, dared to despoil of life and sense practically the whole race of animals, metamorphosing them into marble statues and machines. (To Descartes from 11 December 1648, in Cohen 1936, 50)

To challenge Descartes' theory of the automated behaviour of animals, More (to Descartes from 11 December 1648, in Cohen 1936, 51) invokes in his letter a handful of empirical examples, which for him plainly "demonstrate that reason resides in brute animals." In this respect, More has no difficulty in acknowledging that magpies and parrots, in response to Descartes' example from the "Discourse's" fifth part, (Descartes 2001, 47) are not able to speak intelligibly, since despite being provided with speech organs they (supposedly) merely imitate sounds. Still, he asks, why is it appropriate to deny them "that they are quite aware of what they want, viz., the meal which by this device they acquire from their masters," (to Descartes from 11

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<sup>39</sup> Due to More's sympathy for Descartes' work we can rule out sarcasm or even mockery in this reply, although Cohen surmises that the controversy about animal souls between the two "may be one of the reasons for More's later vehement revulsion against his former idol" (Cohen 1936, 49).

December 1648, in Cohen 1936, 50) even if one readily accepts that they do not speak on their own accord? Why, More (*ibid.*, 51) presses, “do you prefer to make of them inanimate machines rather than bodies activated by immortal souls?”

In his answer, Descartes (to More from 5 February 1649, in Cohen 1936, 52) acknowledges that “although I hold for certain that it cannot be proven that any cogitation exists in brutes, I do not thereby judge that the absence of thought can be demonstrated.” Considering Descartes’ vows for certainty in knowledge alongside clarity and distinction in our perceptions as foundation for truth, his response appears surprisingly vague. Nevertheless, he counters More’s doubts explaining that

after examining whatever seems most probable in this connection, I see no reason to claim cogitation for brutes, except that since they possess eyes, ears, a tongue and other sensory organs such as ours, it appears as if they feel as we do; and since in our mode of feeling cogitation is included, then cogitation should be attributable to them also. Which reasoning, since it is exceedingly obvious, has impressed the minds of all men from earliest childhood. There are, however, other reasons much more numerous and far more convincing, but not so obvious to all, which plainly lead one to believe the contrary. (*Ibid.*)

Indeed, Descartes makes explicit in his letter that he neither denies sense or life to animals, nor even such intriguing traits as “shrewdness and cunning of dogs and foxes” (*ibid.*). Rather, he claims, that he “can most easily explain all those things as arising from the sole configuration of the parts of the body” (*ibid.*). The reason why Descartes withholds cogitation from animals is because of his clear perception “that all movement could originate from the one principle, that is to say, the corporeal and mechanical one” (*ibid.*). This, however, does not yet prove that animals are actually devoid of any form of voluntary behaviour, because of this he only holds “for certain and proven that we can in no way demonstrate any rational soul in brutes” (*ibid.*). The one central reason for Descartes to deny animals any form of voluntary involvement in their behaviour, however, is that even though all animals



most easily make known to us by voice or other bodily movements their natural impulses, such as wrath, fear, hunger, and the like, notwithstanding never yet has it been observed that any brute animal became so perfected as to employ true language, that is to say to indicate either by voice or signs that which could be accounted for solely by cogitation and not by natural impulse. (Ibid., 53)

Indeed, according to Descartes (to More from 15 April 1649, in Cohen 1936, 55), language “alone is certain proof of latent cogitation in the body.” Rather than answering More’s challenge positively hence, let alone provide a certain proof, Descartes continues to rely on a negative claim when it comes to animal behaviour. Instead, I suggest, he reduces the proof for the automation of animal behaviour to the absence of one parameter while suggesting that nothing in the behaviour of animals would require us to ascribe to them reason or a soul or any faculty that would account of their behaviour as voluntary – nothing, of course, other than our experience of animals – and that their behaviour would be plausibly and more convincingly explainable by their physical constitution. Accordingly, Descartes repeats his litany that

to no prejudice are we all more habituated than to that which has persuaded us from earliest childhood that living animals think. No reason indeed moved us to this belief save that seeing that numerous parts of the animal body are not far different from ours in external configuration and motion, and believing that in us there is but a single principle of motion, namely, the soul, which same substance moves the body and cogitates, we doubted not that just such a soul might be found in animals. (To More from 5 February 1649, *ibid.*, p. 52)

In his reply, More (to Descartes from 5 March 1649, in Cohen 1936, 53) appears little impressed though, “for I feel that I am in no wise able to free myself from the snares of this prejudice.” Instead, he remains sceptical, especially in respect to reducing human-animal likeness to bodily resemblance, and counters that the

best proof, in my opinion, is that they watch over and preserve themselves with so much acuteness, as I could illustrate, if there were time, by anecdotes as true as they are amazing. But I take it that you have come across similar stories; although mine are not to be found in any books. (Ibid., 54)

Despite decades of work, it appears Descartes has little to show in respect to the decisive and certain identification of animal behaviour, neither conceptually nor through his method of cognition, as More remains utterly trustful of his experience when it comes to animals, despite his acceptance of Descartes' philosophy otherwise. Moreover, claiming in his previous letter to More that he believes absolute proof of the absence of thought cannot be obtained, "since the human mind can never penetrate into the inmost recesses of the animal being," Descartes (to More from 5 February 1649, in Cohen 1936, 52) even reflects More's uncertainty.

### **The Indeterminable Object**

Despite his doubts, More (to Descartes from 5 March 1649, in Cohen 1936, 54) raises hopes for the *Principles* part five and six to be published soon and that these would contain the proof "that there is no soul in brutes" by accounting for animal behaviour in purely physical terms. Descartes replies, however, that

I am not sure that I will ever bring to light the rest of my philosophy, since it depends on numerous experiments, for the accomplishment of which I know not if I shall be granted the opportunity; but I hope to put out this summer a short treatise on the passions, from which it will be apparent how in our very selves all movements of our members which accompany our passions spring from, not the soul, as I see it, but simply the bodily machine. (To More from 15 April 1649, *ibid.*, 55)

Indeed, the *Passions of the Soul*, Descartes' final publication, presents his most sophisticated account of the behaviour of animated corporeal bodies.<sup>40</sup> The book after all promises to answer or resolve the difficulties identified in Descartes'

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<sup>40</sup> The unfinished and unpublished treatise *Description of the Human Body* from winter 1647/8 comprehensively covers the forming of the body. The treatise does not, however, discuss display and occurrence of behaviour within corporeal bodies. (Gaukroger 1998)

treatment of animals and the determinateness of corporeal objects in general.<sup>41</sup> It contains three parts, which are preceded by an introductory correspondence between Descartes and an unknown friend, wherein Descartes states “that my purpose has not been to explain the Passions as an Orator, or even as a moral Philosopher, but only as a Physicist” (17).<sup>42</sup> Part one contains Descartes’ account of the functioning of the human body and soul as well as their close interrelation, part two provides an enumeration and explanation of the most basic passions occurring in the human, while in part three Descartes turns to an enumeration and explanation of the passions that are either derivatives of the basic passions or composed of them, resembling the structure of Descartes’ proposed methodology (cf. Voss 1989, 18n1, 50n1).

According to the *Passions*’ first book, all sense-perception and muscle movements depend in Descartes’ physiology on animal spirits travelling in the nerves. These spirits are very fine parts of the blood, which are separated from its bigger parts through a filtering process upon entering the brain. According to Descartes, heat excites the blood and makes it move, always flowing from the heart first towards the brain. The passages into the brain are very narrow so that only the “most agitated and the finest parts get there, while the rest spread out into all the other places in the body” (24). These fine parts are the animal spirits, which account for the body’s activities. In contrast to the medieval concept, Descartes’ animal spirits “are nothing but bodies; their only property is that they are bodies which are very

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<sup>41</sup> I am indebted to Dr. Erik-Jan Bos for pointing me towards the *Passions* as central text for the problem of animals in Descartes’ philosophy during a conversation in Oxford in May 2011.

<sup>42</sup> When not further specified, the referenced page numbers in this section hereafter refer to: Descartes (1989, *Passions* [1644–6/49]).

small and which move very rapidly” (24). They are corporeal components of the blood, not incorporeal ones in the sense of ghosts. These particles are then distributed from the brain into the nerves and through the nerves into the muscles, “by means of which they move the body in all the different ways in which it can be moved” (24). Movement of the body’s different members comes about through hydraulic contraction of some muscles and extension of opposing ones, which are caused by a superior number of spirits in the former.

Not that the spirits coming immediately from the brain suffice by themselves to move these muscles – but they make all the other spirits already in the two muscles leave one of them extremely rapidly and pass into the other, whence the one they leave becomes longer and slacker, and the one they enter, rapidly becoming swollen with them, contracts and pulls the member it is attached to. (24)

The individual distribution of the animal spirits has three different causes. Two are of bodily origin, while another one is accounted for by the activity of the soul. The first distributional mechanism relies on the movement of nerves, which consist of three different parts: little filaments that extend from the brain to the members to which they are attached, membranes which surround the filaments and merge in the membrane enclosing the brain, composing little tubes, and the animal spirits travelling in these tubes (24–5; see also Descartes 2001, *Discourse and Essays* [1634–7], 87–113). The filaments are independent parts of the nerves,

completely free and extended, in such a way that the least thing that moves the part of the body where the end of any of them is attached thereby makes the part of the brain it comes from move, in the same way in which, when we pull one end of a cord, we make the other move. (25)

Through their movement, objects of all the external and internal senses are transmitted into the brain, causing the various movements of the body by directing the specific course of the spirits towards certain muscles rather than others. The second bodily cause of directing animal spirits into the muscles is their unequal size

and agitation. Irregularities are accounted for by the various materials they can be made up from due to the different faculties that are involved in their composition, such as different organs but also different foods. The bigger and stronger agitated spirits enter the brain with more force and thus continue longer on a straight line, entering the brain more deeply, resulting in distribution to other muscles than if they had lesser force. This process is complemented by how wide, depending on the actions of the nerves, the pores of the brain are opened.

Thus all the movements we make without our will contributing (as often happens when we breath, walk, eat, and in short do all the actions common to us and beasts) depend only on the arrangement of our members, and on the course which the spirits excited by the heat of the heart follow naturally in the brain, nerves, and muscles – in the same way in which a watch's movement is produced by the sheer force of its spring and the shape of its wheel. (27)

Thereby, Descartes claims to be able to account for all movements of the body by the composition of the different corporeal parts of bodies and their mechanical relationship to each other as well as external objects, without any active or voluntary involvement of the soul.

Having exceeded the functions of the body, Descartes moves on to examine the human soul. Relying on the reasoning from the *Meditations*, he understands the functions of the soul to consist exclusively in thinking. Descartes classifies thoughts further into passions and actions, with

whatever is done or happens afresh is generally called by the Philosopher a Passion with respect to the subject it happens to, and an Action with respect to what makes it happen. ... even though the agent and the patient are often quite different, the Action and the Passion are always a single thing, which has these two names in accordance with the two different subjects it may be referred to. (19)

Following Descartes' definition, his concepts of actions and passions do not differ in respect to their substance, that is, thought, but in their relationship to the subject, with thoughts as actions causing an event and passions being caused by an event and

affecting the subject. In the case of humans, the former are our volitions, “because we find by experience that they come directly from our soul and seem to depend only on it,” while the passions are “all the sorts of cases of perception or knowledge to be found in us ... because it is often not our soul that makes them such as they are, and because it always receives them from things that are represented by” (28) the passions. Although both are placed in the incorporeal realm of the soul, the important qualitative difference between actions and passions lies in their different source of origin and control the subject exerts over them. While the former act on the body, inciting movements, the latter are incited in the soul through the body acting on the soul. Accordingly, the human subject is in control of the former, while it is simply subjected to the latter.

Although passions strictly speaking are not part of the body but the soul, their affection is relying on the soul being “jointly united to all the parts of the body” (35). A bodiless spiritual entity, such as an angel, would be incapable of experiencing passions as it is not receiving any sense-perceptions, since those rely on a body, but also does not require any sense-perceptions, as it has no need to prevent a physical host from harm. Human souls, in contrast, are joined to a body, and although these are in fact two radically different and independent substances, God inexplicably bound the human soul to its corporeal host. In respect to corporeal causes, the passions’ “natural use is to incite the soul to consent and contribute to actions which can serve to preserve the body or render it more perfect in some way” (92). Passions inform us about the degree of harm or benefit objects could pose to our bodies and let the soul induce the adequate action to prevent harm. Whilst Descartes clearly and completely separates incorporeal (*res cogitans*) from corporeal substance (*res*

*extensa*), he in fact also recognises a close and unavoidable relationship or exchange between the immaterial and material spheres in humans. Human body and soul “are united not by position or disposition... – for this ... is ... in my opinion, quite untrue – but by a true mode of union, as everyone agrees, though nobody explains what this amounts to” (to Regius from January 1642, in Descartes 1991, 206). This close union accounts for a defining influence of *res extensa* on *res cogitans*, and vice versa. Albeit separately accounting for (the actions of) the body in the *Passions* in purely automated terms and the human soul as essentially free, rather than turning the former into a mere vegetative vehicle driven by the latter, he discerns an intimate connectedness and profound influence they assert on each other.

Descartes provides the corporal link between the human soul and the human body through the pineal gland, the soul’s residence through which the passions are aroused in the soul and through which the soul’s actions are translated into movements of the body. While each individual passion translates simultaneously into an action, their functioning is actually inverse. Communication between the body and the soul relies on the physical property of the gland being suspended in its cavity so that it can move freely in all directions. Passions are incited in the soul through movements of the gland, which in turn are caused by external or internal sensory stimulation of the body and transmitted to the gland through the animal spirits, the nerves and the blood. Depending on the particular movement, a corresponding passion is aroused in the soul. This passion immediately translates into an action, inciting a corresponding movement in the gland which, in a reverse mechanism to the arousal of passions, directs animal spirits into members of the body, inciting bodily reactions appropriate to the passion. Thus, the gland is either moved by the spirits “in

as many different ways as there are differences capable of being sensed in objects” or equally diversely by the soul,

which is of such a nature that it receives into itself as many different impressions – that is, has as many different perceptions – as there are different movements which take place in this gland. Thus also, conversely, the machine of the body is so composed that, merely because this gland is moved diversely by the soul or any other cause there may be, it drives the spirits that surround it toward the brain’s pores, which guide [the spirits] through the nerves into the muscles, by means of which it makes them move the members. (38)

Although the passions are strictly speaking thoughts and an element of the soul, or our mental faculty, they solely depend on activities or objects that are external to the soul. Not even their effects rely on the active involvement of the soul. Just as the process that takes the animal spirits

toward the nerves of the heart suffices to impart the movement to the gland by which fear is put in the soul, so too, simply in virtue of the fact that certain spirits proceed at the same time toward the nerves that move the legs to flee, they cause another movement in the same gland by means of which the soul feels and perceives this flight – which can in this way be excited in the body merely by the disposition of the organs without the soul contributing to it. (40)

Yet, the particular passions and actions triggered by certain external sensory stimuli vary among different human individuals, since

all brains are not disposed in the same manner, and ... the same movement of the gland which in some excites fear, in others makes the spirits enter the brain’s pores that guide part of them into the nerves that move the hands for self-defense. (40)

Specific (re-) actions are hence a consequence of (pre-) established associations.

Every passion is by nature as well as habituation connected with a corresponding action “from the beginning of our life” (47), while additionally each of the soul’s actions has been joined similarly to some particular movement of the gland, in order to enable us to exercise complex tasks more easily.

So, for example, if someone wills to dispose his eyes to look at an extremely distant object, this volition makes the pupil of [the eyes] dilate; and if he wills to dispose them to look at an extremely close object, this volition makes it



contract. But if he thinks only of dilating the pupil, he may well have the volition but he will not thereby dilate it, inasmuch as nature has not joined the movement of the gland that serves to drive the spirits toward the optic nerve in the manner needed to dilate or contract the pupil with the volition to dilate or contract it, but rather with the [volition] to look at distant or close objects. (42)<sup>43</sup>

Albeit having crossed the border of the corporeal into the incorporeal sphere, there is still no need for any active, conscious involvement of the soul in Descartes' behavioural model of the body. Despite involving physical and mental or psychological capacities to varying degrees in his model, he nevertheless so far accounts for all mental and physical processes as well as their interaction in an automated, predetermined way. Even actions, which are the only mental properties in our power, do not rely on the active interfering of the soul but are caused because passions and actions are by natural predisposition and habituation linked.

Despite these individual base settings in the ménage of thoughts, "one can nevertheless join them to others by habituation" (47). Words, for example, represent by natural disposition "only their sound to the soul when they are uttered vocally, or the shape of their letters when they are written" (47). However, "by the disposition acquired in thinking of what they mean upon having heard their sound or seen their letters," (48) their meaning can gradually be acquired. In a similar way, the connection between movements representing certain "objects to the soul" and their corresponding passions can "be separated from them and joined with other quite

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<sup>43</sup> See Descartes' (2001, *Discourse and Essays* [1634–7], 85–6) description of an according experiment in the "Optics" third discourse "Of the Eye". Although "we are not in a position to understand, either by reasoning or by any comparison drawn from other things, how the mind, which is incorporeal, can move the body, none the less we cannot doubt that it can, since experiences the most certain and the most evident make us at all times immediately aware of its doing do. This is one of those things which are known in and by themselves and which we obscure if we seek to explain them by way of other things" (Descartes to Arnauld from 29 July 1648, in Smith 1952, 280–1).

different ones" (48). Re-forming established links between actions and bodily effects as well as between sensory stimuli and passions can happen in two different ways.

The first is beyond the control of the individual and potentially takes place

by a single action and does not require long practice. Thus when someone unexpectedly comes upon something very foul in food he is eating with relish, the surprise of this encounter can so change the disposition of the brain that he will no longer be able to see any such food afterwards without abhorrence, whereas previously he used to eat it with pleasure. (48)

Notably, this process is the very same in animals,

for even though they have no reason and perhaps no thought either, all the movements of the spirits and the gland that excite the passions in us still exist in them, and serve in them to maintain and strengthen, not the passions as in us, but the nerve and muscle movements that usually accompany them. So when a dog sees a partridge it is naturally inclined to run toward it, and when it hears a gun fired the noise naturally incites it to run away. But nevertheless setters are commonly trained so that the sight of a partridge makes them stop, and the noise they hear afterwards, when [the bird] is fired on, makes them run up to it. (48)

Up to this point, then, no difference is actually detectable between animal and human behaviour apart from a conceptual one. In effect, the behavioural processes are equivalent in humans and animals. Surprisingly, not even on the question of the pure corporal translation of stimuli into reactions in animals, devoid of the detour via passions and actions, that is thoughts, is Descartes absolutely certain here, as they "perhaps" have no thoughts. Instead, "the only thing that makes us men and distinguishes us from the beasts," is "the power to judge correctly and distinguish the true from the false" (Descartes 2001, *Discourse and Essays* [1634–7], 4). Rather than obviously being restricted to extension and motion, the possibility for other, especially incorporeal, elements remains active within Descartes' concept of the animal. Most importantly, the object manifests in this concept as potentially exceeding its physical presence and therefore nonidentical with itself, as it is subject to constant change due to the processes of habituation.

In definitive contrast to animals however, a human individual can also self-induce its re-habitation. According to Descartes, his ability to apply radical, hyperbolic doubt indicates that humans mandate a will that is “by its nature free in such a way that it can never be constrained” (41). This allows humans to interfere with the pre-configured behaviour of the body. Since his example of the dog suggests that

with a little skill one can change the movements of the brain in animals bereft of reason, it is plain that one can do it even better in men, and that even those who have the weakest souls could acquire a quite absolute dominion over all their passions if one employed enough skill in training and guiding them. (48–9)

As implied in this passage, not every person is equally good at this, but while animals are completely devoid of conscious interference, and their reactive patterns only reshape according to processes beyond their control and influence, every human has the potential to learn how to self-shape and -improve their reactive patterns. Need for this arises because the specific organisation of the stimulus-reaction system is

not always good, inasmuch as there are many things harmful to the body that cause no Sadness at the beginning, or even give Joy, and others that are useful to it though they are distressing at first. Moreover they almost always make both the goods and the evils they represent appear much greater and more important than they are, so that they incite us to seek the former and flee the latter with more ardor and more anxiety than is suitable – as, we likewise see, beasts are often deceived by bait, and in order to avoid small evils rush into larger ones. (93)

The mental disposition of passions and actions (or corporal disposition of movements of the gland) can be confused, unfavourable or undesirable. To correct such imperfections, Descartes urges his reader to “make use of experience and reason to distinguish the good from the evil and to discern their true worth, in order not to take one for the other and not to tend toward anything immoderately” (93). Finally, Descartes’ epistemology comes into play. In article 49 of the *Passions*, Descartes

establishes judgements as opposing force to the passions, through which humans can halt or expedite bodily behaviour, suggesting that “strength of the soul does not suffice without knowledge of the truth” (47). The more decisive our judgements are the better they can keep the reactions at bay and improve the functioning of the body. Thus, the more certain we are about our judgements – and we cannot be more certain than indubitably knowing the truth – the more powerful the individual soul will be in relation to its passions. Descartes’ epistemology then explicitly comes around to a controlling device of the cognitive process. By providing humans with a manual of the knowledge, tools and mechanisms to increase their happiness in life, the *Passions* reconnects Descartes’ life’s work with its starting point, the *Compendium*, which anticipated the composition of perfect music to increase the enjoyment derived from it. The project has significantly transformed, however, from perfecting the production of artefacts in accordance with the emotional constitution of the body, into one of control and adjustment of the body and its emotional furnishing through the intellect, both in a practical way through his method, as well as theoretically through his epistemology and mechanistic concept of cognition.

While humans thus mandate the potential to alter their pre-dispositional behaviour consciously and purposefully, corporeal bodies, according to Descartes, are inextricably bound up in their reactive mechanisms, and their re-habitation happens merely due to factors beyond their control. In contrast to human animals, who have reason, nonhuman animals that lack reason “are not free, since they do not have this positive power to determine themselves; what they have is a pure negation, namely the power of not being forced or constrained” (to Mesland from 2 May 1644, in Descartes 1991, 234). Descartes’ argument, however, proves peculiar, warped and

ultimately evasive here. Attesting animals not to be free, he instantaneously certifies them freedom, if negatively, in so far as they are neither forced nor constrained in their behaviour. The freedom he allows humans in turn manifests effectively as restraint, that is the freedom to restrict one's emotional and sensory stirrings.

Whereas the concept of freedom thus turns onto its head and bends to breaking point, even more severe consequences follow for the automation and repetitiveness of animal behaviour and hence Descartes' epistemology. What Descartes means, of course, is that in contrast to humans, animals are incapable of directing, regulating and controlling their behaviour reasonably, and instead let their behaviour be governed by their individual stirrings, therefore making them apparently unfree servants of their physical existence; the undertones of Christian piety in his perspective are undeniable. However, the lack of positive, or reasonable, focussed, goal-orientated self-determination and indeed self-restraint does not necessitate automatised, mechanical, repetitive and hence calculable behaviour.

Having described animal behaviour before as exclusively determined by their physicality, the disposition of organs, external forces acting on bodies and so forth, the contradiction in Descartes' argument is hardly owed to inattentiveness. Instead, it points to the difficulty of submitting the object animal to its definitive determination, while it has to be unfree to make sure that conclusive, certain knowledge of the objective world is possible. Hence Descartes declares animals' lack of freedom, and establishes the indeterminateness of their behaviour negatively. Whereas Descartes' behavioural concept is remarkably complex and sophisticated, and far exceeds the crude dualism he is often accused of, quite ingeniously accounting for a somewhat incongruous human self-experience torn between the independency of its mind and

ligation to and dependency of its body, the *Passions'* concept of the automated body nevertheless implodes the vows of the objective world's (mechanical) automation and reveals the concept's fallacy. According to Descartes' account of the process of habituation in the *Passions* the configuration and re-configuration of sensory stimuli, passions, actions and bodily effects in human and non-human animals, that is, their behaviour, instead depends on individual experiences and hence produces individual differentiation of behavioural patterns and unique empirical, corporeal objects. Animals, unrestrained and unforced in their behaviour as Descartes claims, surface as free and independent individual entities, and their actions are therefore potentially erratic, divergent and spontaneous. The fact that Descartes develops this concept only in conjunction with the human soul and emotional constitution underscores the object's indeterminateness; it seems rather difficult to conceptualise animated objects detached from their particularity. While Descartes hence sets out to produce decisive and certain knowledge of the world, the concept of the corporeal object he ends up with in the *Passions*, especially in respect to the animal, proves irreconcilable with such a project. Descartes' epistemology, in turn, transforms in this context openly from an investigative tool for discovering the truth to one of adjusting, trimming and subduing the subject's experience and cognition, while leaving behind the object just as damaged in order to fit it into consistent conceptual categories.

### **Animal Remnants**

Driven by the desire to gain certainty about the world's constitution, Descartes' philosophy appears to be plagued, if negatively, by a beastly blankspace. From *Rules* to *Principles*, animals and their behaviour remain undetermined. In the *Passions*, the only work in which Descartes confronts the animal, he does so still only indirectly in

an anthropological context, and consequently applying Descartes' concept of behaviour proves animals ultimately indeterminable. Accordingly, there appears to be no definitive answer to the controversy between adversaries and defenders of Descartes' views on animals. Considering that "Descartes' aim is not to eliminate experience and thought from the animal realm, but to show that they can be accounted for, not merely in corporeal terms, but in a way that construes this corporeal substance purely mechanistically," and characterising Descartes' view on animal behaviour in the same breath as "'cautiously agnostic on the whole question'" seem judgements a little too congenial (Gaukroger 1995, 289; see also Harrison 1992, 227). Yet at the same time it appears ill-suited to accuse Descartes of stripping animals of life, emotions, senses or desires. Despite his difficulties with the topic and considering that his concern for animals was merely secondary, Descartes appears incapable of evading the animal as it continuously occupies a significant place in his work.

At the same time, Descartes' project of decisive knowledge retreats from being directed primarily at examining and deciphering physical phenomena in their relationship to humans in the *Compendium*, to the control and suppression of the subject's sensory experience in the *Passions*. However, ascertaining that "when Pagans had Veneration for forests, springs, or mountains, it was not properly those lifeless things which they revered, but the divinities they thought presided over them," Descartes' (1989, *Passions* [1644–6/49], 109) language carries surprisingly strong sentiments. Classifying forests as "lifeless things" seems remarkably drastic for a thinker, who is strongly concerned about precise and accurate descriptions and put much effort into providing a sophisticated, complex – albeit mechanistic –

explanation for nature's activity. Especially, when at the same time he claims that "to no animal do I deny life, inasmuch as that I attribute [it] solely to the heat of the heart" (to More from 5 February 1649, in Cohen 1936, 53). Rather than clearly and distinctly perceiving natural objects as animated involuntarily through external or physical impulses, it seems that the automation of their behaviour has to be overemphasised by declaring them lifeless. While he may not have been uncomfortable with his dualism, (Cottingham 1978, 559) as he unmistakably insisted on the mutual exclusivity of corporeal and incorporeal matter(s) as well as the limitation of the former to its physical extension, and since he undoubtedly considered animals driven purely by physical stimuli, it was much more difficult to actually and plausibly conceptualise animals correspondingly, forcing him to declare that we cannot demonstrate the presence of rational souls in animals, rather than that he confined himself to this statement (cf. Gaukroger 1995, 288).

Blaming indecisive experience, Descartes scales the hurdles to the object's decisive determination through a standardised, methodological procedure for the world's registering. His disciplining of the subject-object relationship acts in both directions: he reduces the subject to intellectual procedures and pushes back any form of emphatic, aesthetic comportment, while reducing the object of knowledge to decisive, quantifiable elements. Nonetheless, Descartes proves only temporarily successful in bringing the animal under control. In the *Passions*, animals indeed re-emerge as ultimately nonidentical; with its introduction of professedly individual, uncontrolled patterns of behaviour, the book radiates certainty at best about the uniqueness of empirical animals. All of which would seem to confirm Horkheimer and Adorno's (2002, 204, translation modified) verdict, namely that "the proper subject



matter for psychology” would be “existence without the light of reason, the actual life of animals,” while the behaviourists, representative for the epistemological paradigm of Modern science and society, “by mistreating animals ... announce they, and only they in the whole of creation, function voluntarily in the mechanical, blind and automatic way as the twitching movements of the bound victims made use of by the experts.”

Of course, this is not to say that Descartes introduced to the world the idea that animals are blindly automatic exemplars of their species. The *Passions* reveal instead a very particular challenge to which Descartes’ proposition responds. In the final article Descartes (1989, *Passions* [1644–6/49], 132) explains that after understanding all our passions, “we have much less reason to fear them than we had before” his comprehensive analysis. Underneath Descartes’ project then, lies a struggle with fear that originates from the unknown, the unpredictable and uncontrollable element of nature and corporeal, physical objects. Instead, Descartes proposes to determine the unknown and thus disenchant the mythical world of corporeal objects. By hypostatizing the object as determined, however, his efforts actually result in a further mystification the object. Contradictory to his materialistic claims about exposing the true workings of the world, Descartes’ philosophy reflects the control and limitation of cognitive processes, not their realisation in accordance with their actual occurrence. Thereby civilisation’s general paradigmatic tendencies of domination in the human-nature relationship manifest in his work, as is the application of reason as means to achieve this domination, that Horkheimer and Adorno uncovered in *Dialectic of Enlightenment*, as well as the constraints of thinking to identification and how they remain unreflected. Rather than perceiving the world

clearly and distinctly and reaching absolute certainty, the development of Descartes' oeuvre reflects instead the subject's struggle with the object of knowledge to submit the latter to the identificatory conditions of thinking within the context of the epistemological turn to the empirical during the sixteenth and seventeenth century (Ben-Chaim 2004; Gaukroger 2006; Hazard 2013) – while also exposing the subject's claim to power by pointing to the ultimate failure of the object's determination.<sup>44</sup>

On the one hand, then, Descartes' work demonstrates the suppression of aesthetic experience through installing a universalised method that is to be followed obstinately. Additionally, it also describes the separation of the reasoning subject from the subordinated (mimetically) experiencing subject of cognition in the constituting phase of the Modern subject. On the other, however, Descartes' struggle reveals the particular challenge animals provide as objects of knowledge to be positively identified. The animal emerges from his writings as particularly resistant against its subsuming to the conditions of identificatory reason, and manifests itself instead as a field of tension that is in itself conflicted and changing; maybe this is why animals have to endure endless mockery and pain at the hands of humans. Although the animal remains ultimately undetermined in Descartes' oeuvre, a negative image of animals as nonidentical entities emerges through the difficulty Descartes experienced with their identification, which contradicts both the decisive determination of corporeal objects as well as Descartes' strict epistemology.

The following studies further trace this negative concept in two steps: natural-philosophically through the ethological writings of Herman Samuel Reimarus, and

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<sup>44</sup> This also seems to explain the sustained interest in and our conflicted relationship to Descartes' work. Descartes, like few others, fought in his oeuvre the struggle between identificatory thinking and resisting object, while powerfully, if ultimately unfruitfully, reining in the object.

epistemologically through the insect studies of Maria Sibylla Merian. Together, they open up the perspective on a negative zoology that honours the nonidentity of animals while confronting the reasoning subject of Modernity with its limitations and ideological justification.

#### 4. Reimarus' Ethology of Animal Artistry

The attempts of Descartes to establish a path to infallible, complete knowledge of the world and a decisive, mechanistic philosophy of nature leave behind an open concept of the animal, both in respect to comprehending the physical activities and psychology of animals as well as animals appearing nonidentical in themselves, that is as continuously and individually developing, living entities. Of course, Descartes' primary subject-matter was knowledge and its certainty and unambiguousness, not animals. Nothing in his writings suggests that he actually studied their patterns of behaviour; he "seems to rely on a very few crude examples: often, banal instances of dogs' behaviour, and sometimes birds', are taken to suffice" (Wilson 1995, 20). Instead, his viewpoint on animals proves speculative and derived from his mechanistic philosophy of nature, even if Descartes is absolutely convinced that the behaviour animals display can be explained exclusively from their bodily makeup and external stimuli. Thus, he writes to Mersenne that

even though we observe in animals movements similar to those which result from our imaginations and sensations ... these same movements can take place without imagination, and we have arguments to prove that they do so take place in animals, as I hope to show clearly by describing in detail the structure of their limbs and the cause of their movements. (To Mersenne from 19 January 1642, in Descartes 1991, 203–4)

Descartes' own scientific involvement with animals, however, remains bound to physiological examinations of their bodies (or parts of their bodies), in order to understand the biological functioning and improve healing of the human animal body (cf., for example, Descartes 2001, *Discourse and Essays* [1634–7], 62). Rather than allowing insights about animals, Descartes' oeuvre revolves around epistemological questions and the rationalising of knowledge, and it therefore provides insights about

epistemology while revealing problematic, contradictory and ideological momenta within early Modern epistemology in relation to natural philosophy. Yet from this perspective, the animal marks a blindspot in Descartes' writings, a particular challenge and limitation to identical, definitive thinking that still awaits treatment.

Developing a genuine and comprehensive ethology in explicit opposition to the shortcomings of the Cartesian theory of mechanistic animal-automata, Hermann Samuel Reimarus turns to the very problem of animal behaviour a good one hundred years after Descartes' death. In his book *General Considerations on the Drives of Animals, Mainly on their Art Drives: For the Understanding of the Interrelation Between the World, the Creator and Ourselves* (1760/2, hereafter referred to as *Drives*) he comments that

Descartes fell on the new fancy: one could explain all actions of animals from the mere mechanism, ... that from the external impression into their limbs, of light, air, sound, evaporations and the like they are set into such motion, which we consider as voluntary actions of a living being.<sup>1</sup> (Reimarus 1982, *Drives* [1760/2], 287)

The contrast between the loose restrictions that the physical construction of bodies provide and the very behaviour of animals, who "otherwise all carry out their work uniformly, nevertheless are able to determine, according to the circumstances, the same item differently in respect to its coincidental features,"<sup>2</sup> (ibid., 289) would render Descartes' assumption absurd. To come to terms with the voluntary behaviour

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<sup>1</sup> „Cartesius gerieth auf den Einfall: man könne alle Handlungen der Thiere aus dem bloßen Mechanismo erklären, [ohne daß man ihnen eine Seele, Leben Empfindung oder Vorstellung zueigen dürfte. Er setzte also, sie wären nichts als leblose Maschinen, welche von dem Schöpfer so künstlich und subtil eingerichtet wären,] daß sie, durch den äußerlichen Eindruck in ihre Gliedmaßen, von Licht, Luft, Schall, Ausdünstungen u. d. gl. in solche Bewegung gesetzt würden, welche wir als willkührliche Handlungen eines lebendigen Geschöpfes ansähen.“

<sup>2</sup> „welche ihr Werk sonst alle ganz einförmig machen, dasselbe dennoch in den zufälligen Beschaffenheiten, nach den Umständen, verschiedentlich zu bestimmen fähig sind.“

animals display, Reimarus develops instead the concept of the ‘art drive,’<sup>3</sup> which Esther Leslie and Ben Watson (2007, 212) suggest includes the acceptance “that animals, like humans, had skills that were specific and prone to development. These skills and skilful applications derive from choices made by animals.” According to Leslie and Watson’s reading of Reimarus’ ethology, he considers animals to “possess ‘natural strivings towards self-development’ and ... act voluntarily” (ibid., 215). As a consequence, they claim that Reimarus’ investigations were much ahead of current critical perceptions of animals, as he “proceeds from the lived particular to abstraction,” and does not “fabricate artificial situations according to generalised notions, and then play logical games with the ‘scientific’ results,” but shows “respect for the particular,” while also speculating “about the animal basis of much human behaviour” (ibid.).<sup>4</sup>

Yet, Reimarus also clarifies in the preface to his book that

I show out of the abilities of animals and characteristics of their art drives that these do not consist in some sort of skilfulness that the animals had acquired themselves through experience or reason, or even a degree of reason, but that they are inborn features, which emerge from the determinate natural forces of animals.<sup>5</sup> (Reimarus 1982, *Drives* [1760/2], 66–7)

His ethology therefore appears highly conflicted. Although acknowledging the limitations of Descartes’ mechanism, the transcription of animal predetermination from their physiology into a psychology of preconfigured drives simultaneously

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<sup>3</sup> Reimarus’ invented term of the ‘*Kunsttrieb*,’ translating literally into ‘art drive,’ proves fraught with an intriguing tension. Its tracing is the central focus of this chapter, and the concept will receive detailed scrutiny later on in the text.

<sup>4</sup> The translation is derived from:

<http://www.militantesthetix.co.uk/polemix/animals.htm>, accessed 28 August 2014.

<sup>5</sup> „Ich zeige, aus den thierischen Kräften und aus den Eigenschaften der Kunsttriebe, daß sie nicht in einer Geschicklichkeit bestehen, welche sich die Thiere selbst durch Erfahrung und Vernunft, oder auch durch einen Grad der Vernunft, erworben hätten; sondern daß sie angeborene Fertigkeiten sind, welche aus den determinirten Naturkräften der Thiere entstehen.“

reveals his theory of animal behaviour no less resolutely deterministic than that of his predecessor; rather than learned, the skills of animals surface as innate. Reimarus thus responds to the immanent and empirical problems of Descartes' animal theory, not the least by turning to empirical observations of animal behaviour, even if predominantly through the literary accounts of others and only very exceptionally his own, while holding on to its identifying tenets. As such, he seems to grant animals the capacity to self-acquire their skills as Leslie and Watson suggest, while in the very same instant depriving animals of any self-mediation and making their behaviour rigidly predetermined beyond their influence. This simultaneity of antinomies, that unintentionally carries contradiction into the attempts of the definite exposition of knowledge, is an embodiment of and underpins Adorno's concept of the dialectical form of reason; the attempt to establish absolute certainty inevitably turns into its opposite. Within this very moment of unintentional veering from one concept to its opposite, however, the window opens onto the true essence of the world. Truth manifests itself in the antinomic simultaneity of the veer. (Knoll and Ritsert 2006; Tiedeman 1997) An immanently critical consideration of Reimarus' ethology then promises to provide a window into the lives of animals, and illuminate the problems of the animal Descartes' writings have raised. Yet at the same time, his work represents a markedly different positivist negotiation of the challenge that animals pose to identificatory thinking a century after Descartes' attempts. As such, the contrasting of Descartes' and Reimarus' works also provides insights into the historical progression of anthropocentric consciousness. Furthermore, there is a prospect that his writing makes palpable the likeness of humans and animals that Adorno detected in being nonidentical and self-mediated, and thus helps raising the

memory of nature in the subject [*Eingedenken*]. His ethology thus promises also to be of help with our current dilemma to come to terms with, both actually as well as conceptually, a seemingly difficult to override experience of nature as self-mediating entity beyond our conclusive determination and control. To recover the animal from Reimarus' ethology proves both as necessary as it is promising.

Reimarus' *Drives*, especially its significantly extended second edition from 1762, marks at least the official endpoint of Reimarus' prolific and diverse oeuvre. His career begins at the University of Wittenberg, where he reads philology and oriental languages from 1716 to 1720 and qualifies as Professor. After a customary study trip from 1720 to 1722 to consult manuscripts at the libraries of Leiden, London and Oxford, he takes up the post of Principal at the *Stadtschule Wismar* in 1723 before finally settling in 1728 as professor of Hebrew and Oriental languages at the Hamburg academic school *Johanneum*. (Mulsow 2011a; Gawlick 1983, 299–300) His scholarly work can be separated into specialist philological questions, which represent the focal point during the first thirty years of his career.<sup>6</sup> The preoccupation with such questions comes to an end, however, with the publication of Reimarus' two-volume biography of Roman historian Dio Cassius (ca. 155–235) in 1750 and 1752 respectively. The other line of enquiry that Reimarus follows and which takes over in his later life is that of a Bible critic and, under the pretence of his occupation with questions regarding religion and faith in his time, that of a philosopher of the Enlightenment. Already since the mid-1730s, Reimarus had worked on the *Apologia or Defence for the Rational Worshippers of God* (hereafter referred to as *Apologia*), a rational consideration of revelatory religion and the

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<sup>6</sup> See Schmidt-Biggemann (1979, 47–9) for a comprehensive list of Reimarus' publications.



demand to tolerate the pursuance of a religion that complies with reason, and which relies on the true existence of God, moral behaviour and immortality of the soul, and the refuting of supernatural revelation. (Alexander 1979, 148; Schmidt-Biggemann 1988, 67; Stemmer 1983, 92–102) Originally, the work was designed to comprise his whole philosophical thinking, but due to its sharp and open criticism of Christianity as revealed religion and the dangers for his social standing that would result from a publication, he eventually separated its positive assessment from the critical parts, (Alexander 1972, 14) allowing him to hold back the latter “until the times are more enlightened”<sup>7</sup> (Reimarus 1972, *Apologia* [1767–8], 41) while yet publishing the former and thereby advancing the Enlightenment. The results of this excision are an outline of a religion based on reason that was published 1754 as the *Distinguished Truths of Natural Religion in Ten Discourses Explained and Secured in a Comprehensible Manner* (hereafter referred to as *Natural Religion*), and a logic that followed suit in 1756 under the title *Doctrine of Reason, as an Instruction for the Right Use of Reason in the Discovery of Truth, Through Two Completely Natural Rules of Agreement and Contradiction* (hereafter referred to as *Doctrine of Reason*). While Reimarus continued to work on his critique of revealed religion, finishing the final version shortly before his death, he kept the *Apologia* secret throughout his lifetime. Parts of it were anonymously published posthumously by Lessing (1774, 1777, 1778), causing the *Fragmentenstreit*, an onerous theological controversy in eighteenth century Germany between enlightened and orthodox Lutheran positions. (Vollhardt 2006) The only first complete version of the work was published in 1972 (Reimarus 1972, *Apologia* [1767–8]).

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<sup>7</sup> „[... mit meinem Willen soll sie nicht durch den Druck gemeinhin gemacht werden,] bevor sich die Zeiten mehr aufklären.“

Even though a fair amount of literature assessing Reimarus' life and oeuvre has accumulated over recent decades, he continues to occupy a subsidiary position within the study of the eighteenth century and the German Enlightenment, and the canvassing of his oeuvre has been rather selective, with several aspects remaining neglected (Mulsow 2011b). Due to the secrecy surrounding the *Apologia's* composition and piecemeal dissemination, coupled with Lessing's fame and of course the magnitude of the controversy surrounding the fragments, as well as the fact that it was among the earliest approaches to the Bible as a historical text, the project by far dominates reception of his work (for example Alexander 1972, 1979; Hübner 2000; Klein 2009; Stemmer 1983). Perhaps because of the weighty emphasis given to the *Apologia* within Reimarus' oeuvre, the *Drives* has received comparably little attention and has been rarely considered as a work in its own right (Kempinski 1982, 21-2, 44-6). Instead, when the book is discussed it is most often either within the context of Reimarus' *Natural Religion* and as a specific application of his theology, (Ingensiep 1996, 107; Israel 2011; Weigl 2012, 17-8) or in the shadow of more prominent philosophers, such as Leibniz and Christian Wolff or Herder and Kant (cf. Baranzke 2002, 249-61; Borchers and Bronisch 2005; Forster 2003; Franz and Müller 2011). At other times, the work is mentioned in passing as an example for zoological or anthropological debates of the eighteenth century (Bierbrodt 2000, 176; Gray 1968, 375; Kuehn 2014, 175; Lifschitz 2012, 169-71; Richards 1982, 250). These perspectives also overlap at times (Gawlick 1985; Walter 1973). Such superficiality in the treatment of Reimarus' ethology is striking though, as the *Drives*, and indeed Reimarus' philosophy in general, enjoyed tremendous popularity during the eighteenth century, with five editions and additional translations into Dutch and

French until 1790, even if negative voices were raised as well (cf. Mendelssohn 1982).<sup>8</sup> Indeed, Reimarus ranked amongst the most preeminent authorities on animal behaviour in the second half of the eighteenth century (Ingensiep 1996, 107; Baranzke 2002, 250). Kant allegedly thought highly of Reimarus' philosophy (Baranzke 2002, 189, 250, 279) and the *Drives* in particular, while Schelling reveals his ardour for the *Drives* in a letter to Reimarus' son, Johann Albert Hinrich (1729–1814).<sup>9</sup> The evolutionary biologist Ernst Mayr (1982, 9, 17) even acclaims the book in his foreword to its Modern reprint edition “the first critical and comprehensive study of animal behaviour,”<sup>10</sup> and suggests that Reimarus already would have “thrown up

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<sup>8</sup> An English translation that seems to have been planned did not materialise. „Wegen der englischen Übersetzung der sehr schätzbaren beyden Büchern von der natürlichen Religion und von den Trieben der Thiere habe noch keine Hofnung fahren lassen, nur wünschte ich, daß Herr Bohn von jedem noch ein Exemplar auf Schreib Papier hätte, das einem Engelländer nothwendig besser ins Auge fallen muß, als das gewöhnliche Druk. Papier. Der londonsche Buchhändler Dodsley hat mir deshalb keine abschlägige Antwort gegeben, nur verlangt er, daß es von einigen seiner Freunde vorher beurtheilet werde, um seine kaufmännische berechnung darnach zu machen, und zu untersuchen, ob es Abgang haben werde“ (Lucas Friedrich Zigel to Reimarus from 30 August 1764, Folder 622–1/86 A23, Reimarus Correspondences, Staatsarchiv Hamburg, my transcript).

For an overview of eighteenth century reviews see Schmidt-Biggemann (1979, 63–5).

<sup>9</sup> You are „der einzige oder doch fast der Einzige, der mit philosophischem Wissen u. Vermögen jenen unschätzbaren Natursinn verbinde, ohne den meines Erachtens in der Weltweisheit nur morttra u. porteala [?] erzeugt werden. Ich denke von dem Philosophen, was Kästner [?] vom Poäten [?]; wer nur das eine oder andre ist wird wenig ausrichten. Aber gleichwie eine lange Zeit man glaubte, Poäsie [?] von Nichts und aus Nichts machen zukönnen, u. das Talent Verse zu machen für ...mgat alle möglichen Kenntnisse galt: ebenso hat man auch meist von u. aus Nichts philosophiren wollen u. das Talent Begriffe oder gar nur Worte zu machen für besser gewertet [?], als alle Kentnisse der Welt. Seit ich die von ihnen so vielfach bereicherten u. erweiterten Betrachtungen über die Kunsttriebe der Thiere in meiner frühen Jugendzeit zu einem meiner Lieblingsbücher gemacht [?], habe ich immer ein besondere Liebe u. Unaustilgbare hochachtung behalten“ (Schelling to J.A.H. Reimarus from 5 December 1812, Folder 622–1/86 C13, Reimarus Correspondences, Staatsarchiv Hamburg, my transcript).

<sup>10</sup> „... es handelt sich dabei um die erste kritische und zusammenfassende Studie über tierisches Verhalten.“

questions that still remain topical, and unsolved really, today.”<sup>11</sup> Despite these brief references, the only substantial study of Reimarus’ book still remains Karl Christoph Scherer’s *The Animal in the Philosophy of Hermann Samuel Reimarus* from 1898.

Considering the scientific authority Reimarus seems to enjoy, the general indifference towards Reimarus’ ethology reflects an attitude that has internalised the assumption about Modern science as a continuously progressing accumulation and advancement of our knowledge, and that in the wake of the unequalled triumph of the Modern scientific paradigm consequently considers the diverse perspectives on nature during this paradigm’s early days of the seventeenth and eighteenth century as obsolete or at best crude, in any case unpromising for contributing anything of significance to current scientific debates. Scholars, it appears, indeed “find it hard to concede that an eighteenth-century thinker who wrote entertainingly about otters and spiders might have anything important to say” (Leslie and Watson 2007, 216). Although Reimarus’ involvement with animals undeniably fits into his account of religion founded on reason, to conceive of the *Drives* as no more than “basically ... a continuation of” (Israel 2011, 193) his *Natural Religion* overlooks the fact that it also presents a genuine and elaborate theory of animal behaviour, even if the preoccupation with the subject-matter is justified with the worship for God (cf. Kempfski 1982, 32–5). The few scholarly articles that have taken up the *Drives* as a scientific study of animal behaviour tend to mediate the contradictions in Reimarus’ work in contrast too readily, in order to distil a coherent theory of animal behaviour from the *Drives* and locate Reimarus within the developments of biology as a discipline (Bowler 2005; Cheung 2006; 2008, 87–104; Jaynes and Woodward 1974a,

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<sup>11</sup> „Reimarus hatte bereits Fragen aufgeworfen, die auch heute noch aktuell und eigentlich ungelöst sind.“

b; Kempski 1982). While these works provide helpful insights into Reimarus' ethology, they cannot be considered more than first approximations of a substantial approach to his ethological work.

Indeed, the difficulty with framing Reimarus' oeuvre seems to be that it remains intellectually ambiguous. Reimarus appears to be a much more moderately reformist and maybe even conformist philosopher of the Enlightenment than his attack on Christianity of the *Apologia* suggests. His criticism of revealed religion and ecclesiastical authority was as radical as the rest of his philosophical oeuvre was moderate and even conservative. Even though his natural philosophy provides a vicious critique of mechanistic materialism, it proves fuelled by a repulsion against attempts to closer relate humans and animals on the one hand, and by a naturalism that rigorously refutes any evolutionary notions and sees nature almost as involuntarily and automatically behaving as any mechanism on the other. (Israel 2011) Attempts that flatten these ambiguities, however, neither do his work justice nor do they allow insights into his subject-matter and its empirical depths, as they mainly trim it to fit it in with pre-established categories of thought (possibly in the hope to thereby valorise it). To close in on the animal through Reimarus' theory of animal behaviour, a detailed reconstruction of the development of Reimarus' account of animal behaviour and his writings that preserves these ambiguities is therefore required. However, since the subject-matter of my examination is the animal, not Reimarus' philosophy, I will focus my attention on those texts that address animals explicitly. His early lecture *The Instinct of Animals as a Sign of the Existence of God and His Omniscience* (hereafter referred to as *Instinct of Animals*) from 1725 provides an immanent perspective on the *Drives* within Reimarus' thinking. From there, the

discourse five of *Natural Religion* with the title 'Of God's Particular Intentions in the Animal Kingdom' leads to the *Drives*. Because it is Reimarus' declared intention to decisively identify animal behaviour, I rely in my analysis, just as before, on a negative dialectical approach that emphasises the contradictions within Reimarus' animal theory to be able to make the material animal visible through his appropriation. Due to Reimarus' general unfamiliarity and nonexistence of English translations of his works, I rely frequently on original quotes.

### **A Principle of Animal Actions**

While the *Drives* stands at the end of Reimarus' career, animals and their behaviour occupied Reimarus indeed throughout his life and even within his official capacity (Kempfski 1982, 32). In 1725 he had compiled a lecture, *Instinct of Animals*, which outlines the agenda of a series of four talks on the superiority of the human body over the animal body in his capacity as principal at the *Stadtschule Wismar* (Gawlick 1983, 299-300; Overhoff 2008; Reimarus 1982, *Instinct of Animals* [1725]). Although mentioned frequently to emphasise Reimarus' lifelong occupation with questions concerning animal behaviour and his genuine zoological interest in animals, the lecture has never been considered in detail. Delivered by four of his students, the first two lectures of the series introduced and praised the senses and anatomy of the animal body, while the third argued that no advantage derives from these qualities, and the final one proved that the human body deserves true superiority over the animal body (779).<sup>12</sup> The title of Reimarus' lecture reveals the central rationale in the

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<sup>12</sup> When not further specified, the referenced page numbers in this section hereafter refer to: Reimarus (1982, *Instinct of Animals* [1725]).

observation and examination of animals as means to perceive God, demonstrate His existence and unravel His intentions. But, he notes,

most who have undertaken this so far derived the convincing power and reinforcement of their conclusions in principle merely out of the anatomy and correspondence of bodies. I only know of few, who have, in this type of arguments, also considered the instinct and ability to act, which is instilled in the bodies of animals.<sup>13</sup> (759)

Reimarus claims that the divine spirit shows just as well in their actions, devoting his paper to expounding how. The first half of the talk, and thus a significant proportion of the text, is made up by various, mostly classical examples of animal behaviour in comparison with human behaviour. Drawing on chapter seven of Aristotle's *History of Animals*, which deals with the semblance of animal and human behaviour, (cf. Aristotle 1991, 57–61) Reimarus begins by discussing the striking and remarkable likeness between certain animal and human actions.

Indeed, when bees, ants and mice in the fields collect their food for winter, and in fact in some cases with such skilfulness, for example when mice squeeze backwards into a stack of grain so that they can carry away the seeds that stick to their ruffled hairs, who has taught the animals, that there is an everlasting alternation of winter and summer or that the former is less rich in grain?<sup>14</sup> (761)

Moving on to “the choice of nutriments and medications, with which they help the ill-fallen or injured body”, Reimarus claims “animals even have proven themselves as teachers of humans. For the swallows have shown us the celandine, the burning bush

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<sup>13</sup> “Die meisten, die das bisher unternommen haben, haben hauptsächlich bloß aus dem Bau und der Übereinstimmung der Körper die Kraft und den Nachdruck ihrer Schlüsse abgeleitet. Nur wenige kenne ich, die in dieser Art von Argumenten auch an den Instinkt und die Fähigkeit zum Handeln, die den Körpern der Tiere eingepflanzt ist, gedacht haben.”

<sup>14</sup> “Denn wenn die Bienen, die Ameisen und die Mäuse auf dem Felde ihre Nahrung für den Winter sammeln, und zwar in einigen Fällen mit solcher Geschicklichkeit, daß man zum Beispiel sieht, wie Mäuse sich rückwärts in einen Getreidehaufen hineinquetschen, damit sie so die an den gestäubten Haaren haftenden Körner wegtragen können, wer hat dann diese Tiere gelehrt, daß es einen ewigen Wechsel von Winter und Sommer gibt oder daß jener weniger reich an Getreide ist?”

the deer, the tortoises the stone mint”<sup>15</sup> (763). He finishes his examples quoting Horace and Lucretius, pointing out the implicitness with which each animal species uses its weapons, such as the wolf’s teeth or the bull’s horn, and their way of producing and caring for their offspring. Relying mostly on literary accounts of animal behaviour, a choice possibly owed to Reimarus’ own occupation with classical literature, but also on the odd story conveyed to him by acquaintances, Reimarus thus departs from the same problem Descartes had identified in the common consideration of animals as voluntary entities, only by engaging more intensely with empirical examples.

In the second half of his text, Reimarus moves on to elaborate on the causes of animal behaviour. In opposition to mechanistic explanations, which explain the behaviour of animals purely from their anatomy, he concludes that the intricacy of the examples signals a certain impetus implanted into animals, which enables and encourages them to execute such actions. Yet the wisdom that also shows within the intricacy of animal behaviour cannot be ascribed to reason. Since reason can be understood to denote

nothing else than a force or a faculty to understand, I do not see, why all unreasonable creatures should have invented exactly that what they know, while none of them should not know what they just as well could comprehend with the same faculty to understand.<sup>16</sup> (771)

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<sup>15</sup> “Was die Auswahl von Nahrung und Medikamenten betrifft, mit denen sie dem erkrankten Körper zu Hilfe kommen, so haben sich die Tiere sogar als Lehrer der Menschen erwiesen. Denn die Schwalben haben uns das Schöllkraut gezeigt, das Diptam die Hirsche, die Schildkröten die Cunila.”

<sup>16</sup> “Denn wenn mit der Vernunft nichts außer einer Kraft oder einem Vermögen zur Einsicht bezeichnet wird, so sehe ich nicht, warum alle unvernünftigen Lebewesen genau das, was sie wissen, erfunden haben sollen, keines aber dasjenige nicht wissen soll – und keines überhaupt etwas anderes wissen soll –, was es doch mit demselben Vermögen zu wissen nicht weniger einsehen könnte.”



Furthermore, what

originates in an invention tends to differ according and similar to each one's natural orientation, which is necessarily different in each individual: just as we witness in humans that some configure their lives in this, and others in that way. But in unreasonable beings, one finds always one single, completely similar manner to build the nest, one single manner to defend themselves, one single manner to hunt and one single manner to produce offspring.<sup>17</sup> (771)

Just as Descartes, Reimarus relies on an argument of the apparent absence of versatility and flexibility in animal skill to deprive animals of the ability to actively self-mediate their behaviour. Yet, due to the apparent perfection and the supposed immediate ability as well as similarity with which they perform their actions, Reimarus argues that animals require some sort of “unvarying and constant natural instinct, impulse, impetus, appetite or if any other Latin word describes it, what the philosophers term a natural behavioural characteristic,” which is to say animals have “a certain disposition and preparedness to act”<sup>18</sup> (773–5). Whereas such instinctual preconditioning is present in humans as well, he considers them to be much more broadly present in animals than humans. These characteristics can be either acquired through practice, as is the case with most humans, or they stem from supernatural, divine endowment, either spontaneously bestowed on an individual by God or instilled by nature according to natural laws instated by God. (775) Because animals

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<sup>17</sup> “Denn was aus einer Erfindung kommt, das pflegt je nach eines jeden natürlichen Anlage, die notwendig bei den Individuen unterschiedlich ist, in gleicher Weise unterschiedlich zu sein: wie wir sehen, daß von den Menschen die einen ihr Leben auf die eine, die andern auf die andere Weise einrichten. Aber bei den unvernünftigen Lebewesen findet man jeweils eine einzige, ganz ähnliche Art und Weise, das Nest zu bauen, eine einzige Art und Weise, sich zu verteidigen, eine einzige Art und Weise zu jagen und eine einzige Art und Weise, Nachkommen zu erzeugen.”

<sup>18</sup> „In der Tat bleibt nichts übrig, als daß wir annehmen, daß die unvernünftigen Lebewesen das Erwähnte ausführen mit einem gleichbleibenden und beständigen natürlichen Instinkt, Impuls, Impetus, Appetit, oder wenn irgend ein anderes lateinisches Wort das bezeichnet, was die Philosophen eine natürliche Verhaltenseigentümlichkeit nennen. [...] Sie ist nämlich eine gewisse Neigung und Bereitschaft zum Handeln.”

display perfection and incredible wisdom in their actions to a degree that even humans are incapable to match and have to admire, and yet still show no understanding or comprehension of their actions and therefore must lack reason, their wisdom has to originate from an external source of exceptional knowledge. This, Reimarus concludes, would suffice to exemplify “how the examination of created things and even the nethermost animals forces the human spirit to ascend to the highest master craftsman, and I claim that this is the most splendid yield we receive from the examination of nature”<sup>19</sup> (777).

Even though Reimarus devotes a considerable proportion of his text to examples of actual animal behaviour, rather than investigating the emergence of their behaviour, he leads his discussion back to divine pre-determination and argues that involvement with animal behaviour would lead one quite necessarily to the recognition of God and devout, pious behaviour. Whereas a personal fascination for the intricacy of animal behaviour may very well coexist with this perspective, Reimarus’ primary interest proves neither biologically nor philosophically motivated (cf. Kempfski 1982, 33) and directed at the determination of functions of animal behaviour, but rather at reverence. The examples Reimarus invokes in his lecture are supposed to evince God’s omnipotence. Reminiscent of Reimarus’ lifelong and thorough involvement with questions regarding the proper education and upbringing of children as well as the promotion of a pious and just society, (Alexander 1974, 56–9; Steiger 2013) his preoccupation with the behaviour of animals is meant to promote the social advancement of society through reasonable, religious education. This then,

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<sup>19</sup> „So habe ich in ganz wenigen Worten gezeigt, wie der menschliche Geist gezwungen wird, von der Betrachtung der erschaffenen Dinge und sogar der niedrigsten Tierlein zum höchsten Werkmeister aufzusteigen, und ich meine, daß dies aus der Betrachtung der Natur als der vortrefflichste Ertrag uns zufließt.“

seems also to be the rationale behind the lecture-series itself. Locating the source of instruction within this preoccupation with the most intricate, odd and indeed inexplicable animal behaviour, while at the same time affirming the pre-determination of such behaviour by God, however, Reimarus faces the same difficulties as Descartes in overcoming the assumption that animals potentially behave as voluntarily as humans. Even more pressing is the difficulty of decisively determining such ultimately inexplicable phenomena in order to underwrite his concept, and hence to provide a reliable explanation for their behaviour. For this he relies, in stark contrast to Descartes, on an immaterial, psychological concept of the instinct. Nevertheless, Reimarus also implies that animals behave in a similarly automated and non-voluntary way to that described by Descartes, even if he introduces a psychological momentum into the equation. The meandering language Reimarus employs in describing the principle that moves animals, already foreshadows similar difficulties to those Descartes faced in determining or conceptualising animal behaviour decisively.

### **Repetition and Adjustment**

No record exists of Reimarus' involvement with animal behaviour for the decades following the *Instinct of Animals*, but his son Johann Reimarus (1982, *Drives* [1773], 584) states how his father continued to occupy himself with the matter throughout this time, "now and again noting down news from esteemed authors about" the drives of animals to "infer general judgements through collating and examining reliable observations."<sup>20</sup> Upon turning his attention from philological towards philosophical

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<sup>20</sup> „Er hatte daher gelegentlich aus bewährten Schriftstellern die Nachrichten davon [den Trieben der Tiere, AK] ausgezeichnet, wie dann aus Gegeneinanderhaltung und

questions, however, Reimarus also returns to animals in his writing, dedicating a whole chapter of the *Natural Religion*, (368–498)<sup>21</sup> headed ‘Of God’s Particular Intentions in the Animal Kingdom,’ to the study of their behaviour. Stretching over ten chapters, the book as a whole sets out to reveal God’s existence and intentions in the world through close consideration and examination of nature, animals and humans. Discourses one to three unfold a proof of God’s existence through showing how the world cannot exist without a Creator; discourses four and five elaborate how God is recognizable in the world in general and the animal kingdom in particular, while discourses six and seven develop an anthropology in demarcation from animals; discourses eight to ten, finally, reveal God’s Providence and intentions in the world (Gawlick 1985). While as such it turns against traditional, revealed Christian religion and posits against it a religion based on reasonable inquiry into the world, Reimarus’ project proves motivated by his observation “that for some years an unwonted amount of small scripts, mainly in French language, are distributed over the world, in which not merely Christianity, but rather all natural religion and morality are derided and contested”<sup>22</sup> (56). The particular problem with these writings – he refers most likely to such anti-religious materialistic mechanists as Jean Meslier (1664–1729), La Mettrie (1709–1751) and Baron d’Holbach (1723–1789), but also devout mechanists like Buffon (1707–1788), who merely rejected any direct involvement of God in the affairs of nature – is that “the common deprivation of

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Erwägung zuverlässiger Beobachtungen die allgemeinen Urtheile gefolgert werden mussten.”

<sup>21</sup> When not further specified, the referenced page numbers in this section hereafter refer to: Reimarus (1985, *Natural Religion* [1754]).

<sup>22</sup> „...daß seit wenig Jahren eine ganz ungewohnte Menge kleiner Schriften, mehrentsils in französischer Sprache, über die Welt gestreuet ist, worinn nicht sowohl das Christenthum, als vielmehr alle natürliche Religion und Sittlichkeit, verlacht und angefochten wird.“

rational knowledge of the principal truths of all religion and honourableness, considering present freethinking,"<sup>23</sup> (56) would provide allegedly outlandish and embellished heretic pleadings with the opportunity to undermine a religiously and morally appropriate conduct. Within such an intellectual climate of rational inquiry and uncertainty, the revelations and with them Christian religion, according to Reimarus, lose their authority and persuasiveness because "no-one who relies on and uses his natural ability to judge and the knowledge acquired by means of it, can be convinced from the revelation and its secrets"<sup>24</sup> (62). Moreover, "the proofs from Scripture achieve nothing, where doubts arise about principal truths from a blinded reason"<sup>25</sup> (62). Indeed,

how can one believe with reason that the revelation comes from God, when he has not been convinced before, that a God exists? ... How can he expect salvation, and hope for a reward, when he had let himself be talked into not having a soul, or that the whole human is merely a decomposable machine?<sup>26</sup> (57)

Reimarus' critique therefore is aimed at two targets, which both however stand for the undermining of piousness and morality, stemming from the rise of reason: on the one hand the contradictoriness of the Scriptures, on the other an alleged general weakness in employing reason properly in the recognition of the world, that is in a godly manner. Whereas the former undermines the authority of religion due to its

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<sup>23</sup> „Der gemeine Mangel eines vernünftigen Erkenntnisses von den Grundwahrheiten aller Religion und Ehrbarkeit stellet die Gemüther, bey der jetzigen Freydenkerey, [nicht einmal für ihren eigenen, geschweige denn für fremden und geschmückten Einwendungen in Sicherheit.]“

<sup>24</sup> „Niemand kann von der Offenbarung und deren Geheimnissen überführt seyn, als der sein natürlich Vermögen zu urtheilen, und dessen Erkenntnis mit sich bringet und brauchet.“

<sup>25</sup> „...wo ein Zweifel an Grundwahrheiten aus einer geblendeten Vernunft entsteht...“

<sup>26</sup> „Denn wie kann einer mit Grunde glauben, daß die Offenbarung von Gott komme, wenn er nicht vorher überführt ist, daß ein Gott sey? ... Wie kann er eine Seligkeit gewärtigen, und eine Belohnung hoffen, wenn er sich hat überreden lassen, daß er keine Seele habe, oder daß der ganze Mensch eine bloße verwesliche Maschine sey?“

irrationality, the latter does so due to inviting impious, materialistic thinking. The background of Reimarus' critique is the reinforcement of the awareness of God's existence and of the authority of religious-moral principles within the historical circumstances of the Enlightenment. (Cf. Schmidt-Biggemann 1988, 67) Since "if there is anything that can and must be grasped by everyone, it is such cases of found reason, which are very clear, and in their implication quick to comprehend,"<sup>27</sup> (62) he sets a devout rational inquiry into the world that intends to produce reasonable and easy to comprehend arguments for the existence of God and religious-moral guidance, and thus he relies on enlightened means himself in order to counter the weakening of trust and reliance in God. Reimarus proves therefore to be critical of as well as affirming the Enlightenment at the same time, while his critical stance is characterised overall neither by enlightened scepticism towards religion nor natural-philosophical contradictions of mechanism, but rather by the threat that derives from certain enlightened thinking for the established social conditions.

On the one hand therefore, *Natural Religion* appears concerned with securing and defending Christian belief against certain historical tendencies or strains of

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<sup>27</sup> „Wo etwas ist, das bey allen Eingang finden kann und muß, so werden es solche Gründe der gefunden Vernunft seyn, die eine große Klarheit haben, und in ihrer Folgerung bald zu überdenken sind.“

The resemblance to Descartes' argument is striking, and becomes more strikingly still. Thus Reimarus declares that "I have always pursued this natural and simple way of thinking; especially in metaphysical truths, where I had reason to wish for a shorter and saver way to the unswerving reassurance of the souls. Maybe I have found on this untrodden path obvious proofs for the most important truths, which others, relying on the compass of orthodox school method, have walked past in devising their world wisdom; maybe they could convince all and everyone better, and neither deter the souls by all too dry astuteness, nor leaving no impression even on the profound. After all, I would like to remedy the lack of rational understanding in an easy and pleasant way!" (63–4) Yet while Descartes follows his path to truth through spiritual contemplation, Reimarus proposes to reach it through opposing means of empirical observation.

Enlightenment thought that do not merely valorise reason against blind faith, but drive their rational inquiries so far that they dispose of, or at least weaken the immediate authority of religion and God, which would prove particularly disastrous in the face of a common inability to use reason properly and in turn an ability to withstand such irreligious tendencies. On the other hand, however, the book updates Christian faith in the face of the Enlightenment's increasing establishment. In a way that echoes the *Instinct of Animals*, though, both aims interlock to make sure that a certain religious and moral conduct is secured and society saved from apparent decline. Reimarus intends to provide reasonable arguments for God's existence through an examination of nature as well as a critique of natural philosophy that explains nature's functioning purely out of its physical existence. Instead, the rational examination of nature means to show precisely that nature cannot subsist without a Creator. Even though the book thereby remains firmly but conservatively and conformingly within the spirit of his times, Reimarus' natural philosophy is not driven by aligning theology with the rising sciences of the Enlightenment as Franz and Müller (2011, 113) suggest.<sup>28</sup> Instead, he appears as an ambiguous enlightened thinker both expediting the Enlightenment as well as exercising restraint, although it seems questionable if this really makes him a "split intellectual personality," (Israel 2011, 184) whose outlook was partially radical and even subversive, but moderate in his thinking otherwise. More likely, his occupation of a reasonable middle-ground between the striding ahead of the Enlightenment and its domestication seems to reflect the righteous perspective of a pragmatic conservative of the rising bourgeoisie.

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<sup>28</sup> Indeed, Reimarus even explicitly devalues the sciences against a pious consideration of natural history (381).

The study of animals serves within his project of a close examination of God's purposes as evidence through their particular manifestations:

Let us then turn to the animal kingdom, and closer examine the particular implementation of [God's] magnificent intentions, so that we come to a more vivid perception of the immeasurable wisdom, kindness and might of the Creator, yet eventually also of ourselves, and the excellent purpose for which we are destined.<sup>29</sup> (368)

Although the myriad forms in which animals roam the earth display the artisanship of the Creator, marvelling at their appearance achieves reverence for God's magnificence rather than the recognition of his intentions (378–9). In contrast, and following his earlier work *Instinct of Animals*, he claims that “nothing in the world, especially in the animal kingdom, elucidates clearer the intentions of the Creator, and the wisdom and kindness contained therein, as the drives, abilities and arts of the unreasonable animals”<sup>30</sup> (371–2). Looking at the behaviour of animals is therefore a mediating step in securely discovering God's intentions to provide moral guidance for humans, through the consideration of some of his creations. Their study is religiously and morally instructive, rather than of scientific quality, as it shapes “our mind, according to the infinite mind, through comprehending the grandest perfection; and our will, according to the very best will, for the fulfilment of the Creator's most noble intentions, and for the love of us and others”<sup>31</sup> (382).

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<sup>29</sup> „Lasset uns denn in das Thierreich hinein gehen, und die besondere Ausführung dieser herrlichen Absicht genauer betrachten, damit wir ein lebhafteres Bild der unermesslichen Weisheit, Güte und Macht des Schöpfers erhalten, endlich aber auch auf uns selbst, und den vorzüglichen Zweck, wozu wir bestimmt sind, kommen mögen.“

<sup>30</sup> „...daß nichts in der Welt, zumal im Thierreiche, die Absichten des Schöpfers, und die darinn liegende Weisheit und Güte, klärer vor Augen lege, als die Triebe, Fertigkeiten oder Künste der unvernünftigen Thiere.“

<sup>31</sup> „...wird also unser Verstand, nach dem unendlichen Verstande, durch Einsicht der größten Vollkommenheit; und unser Wille, nach dem allerbesten Willen, zur



Consideration of animal behaviour suffices particularly well for this, because “experience shows us on our earth, how nature gradually descends from the human to animal organisms [*Tierpflanzen*]. It is animals aside from us that come somewhat close to our mind and senses”<sup>32</sup> (374). Whereas animals hence resemble humans, something that is necessary if their study is supposed to be capable of providing guidance for humans, the latter rely, with more or less success, on reason to freely instruct their behaviour. Animal behaviour, in contrast, is not impeded by “empty words, illusions, phantasms, or mere conjectures”<sup>33</sup> (381) of failed reason or vainglory. Instead, they

exercise with innate skill a thousand kinds of unlearned arts, for their and their species sustainment, that contain even more distinctive signs of a higher reason that has thought for the most ignorant animals and instilled in them through nature and birth various un-improvable inventions for their benefit, so that they can immediately set them in motion blindly, yet with no failure.<sup>34</sup> (379)

Resemblance between humans and animals ceases therefore within the uniformity, innateness and invariability of their actions.

The birds build their nests, each according to its species, as at Adam’s times; and the one beehive in Europe has no other form of government or different laws, than the other ones in Asia. Thus also the arts of animals do neither improve nor impair.<sup>35</sup> (409)

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Erfüllung der edelsten Absichten des Schöpfers, und zur wahren Liebe gegen uns und andere Menschen, gebildet.“

<sup>32</sup> „Die Erfahrung weist uns auf unserm Erdboden, wie die Natur vom Menschen allmählig bis auf Thierpflanzen hinunter steigt. Es sind neben uns Thiere, die uns am Verstande und an Sinnen etwas nahe kommen...”

<sup>33</sup> „... leeren Wörter, Einbildungen, Hirngeburten, oder bloße Muthmaßungen...”

<sup>34</sup> „...darinn sie tausenderley unerlernte Künste mit angebohrner Fertigkeit, zu ihrer und ihres Geschlechts Erhaltung, ausüben, enthalten noch deutlichere Merkmaale eine höheren Vernunft, welche für die unverständigsten Thiere gedacht, und ihnen so mancherley unverbesserliche Erfindungen zu ihrem Besten, mit der Natur und Geburt einzuflößen gewußt hat, daß sie dieselbe sofort blindlings, und dennoch ohne Fehl, ins Werk setzen können.“

<sup>35</sup> „Allein, die Vögel bauen ihre Nester, jedes nach seiner Art, wie zu Adams Zeiten; und der eine Bienenstock in Europa hat keine andere Regierungsart oder andere

Although this perspective suggests the behaviour of animals unwinds according to a marked out, pre-established plan and thus brings Reimarus surprisingly close to the mechanists of the seventeenth and eighteenth century, he clarifies in opposition to the latter that sensations alone would not suffice to explain the actions of animals. Extending on his argument from *Instinct of Animals*, the reason for this is that sense perception

cannot result in anything in the soul other than that it seeks to preserve the good and pleasant, and eliminate the bad and unfavourable: but sense perception cannot imprint the way to act on the soul, and its skills and art, nor spawn such actions which have no origin in previous experience.<sup>36</sup> (400)

While sensations may very well incite animals to act, they can neither explain the specific actions they follow to achieve their well-being nor the particular ways in which they execute them.

Among other examples, Reimarus illustrates his claim particularly strikingly with a discussion of Buffon's theory of the organisation of bee colonies. In principle, Reimarus explains, Buffon claims that the organisational principles of the beehive could be established from the physical necessities of the individuals to institute themselves in the most comfortable way in the restricted space of the hive. All working against one another with exactly the same force in their attempt to acquire the most space, they end up with regular, hexagonal combs.<sup>37</sup> Relying on observations

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Gesetze, als wie die andern in Asien. So nehmen auch die Künste bey den Thieren nicht zu, nicht ab.“

<sup>36</sup> „Dieses aber kann weiter nichts in der Seele nach sich ziehen, als daß sie das Gute und Angenehme zu erhalten, und das Böse und Widrige von sich zu entfernen sucht: es kann aber der Seelen die Art zu handeln, und deren Fertigkeit oder Kunst, nicht einprägen, noch solche Handlungen hervorbringen, die in der vorigen Erfahrung keinen Grund haben.“

<sup>37</sup> Reimarus relied on an early German translation of Buffon's *Histoire naturelle générale et particulière...* (44 volumes, 1749–1804), published between 1750 and 1774 under the title *Allgemeine Historie der Natur nach allen ihren besonderen Theilen*

by the entomologists Jan Swammerdam (1637–1680) and René Antoine Ferchault de Réaumur, (1683–1757) Reimarus poignantly shows however how empirical examples would disprove the simplistic order of Buffon’s theory. Neither is it true, Reimarus explains, that all bees of a colony hatch at the same time, nor are they physically bound to the hive. Instead, the laying of eggs, the hatching and the metamorphoses happen throughout spring and summer, rather than all at once, and eggs, larvae, pupae, and bees consequently are all in the hive at the same time, while they also continuously swarm out. Similarly, it is untrue that each bee tries to occupy the largest space possible, individually working against all other bees, building a comb as its dwelling to secure space for itself. Indeed, not only do bees cooperate in the construction of the combs, they do not even live within the cells of the hive, but use them to house honey, eggs and larvae. Quite on the contrary, when they are in the hive and “have no particular reason to do something,” they lie “in a lump in the top of the hive, and therefore try to take up the very smallest space possible”<sup>38</sup> (419). Finally, it also seems unreasonable that a space is pre-established for the hive before they even set out to build it, as would be necessary to create a limitation in space that would account for a reciprocal obstruction in their striving for a large space. Who, Reimarus questions however, “forces them to raise their burrow so close to others” as

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*abgehandelt...*, with an introduction by Doctor Albrecht von Haller (cf. 973). Reimarus’ library contained the translation’s first 5 volumes (Schetelig 1978, 187, items 2397–2401). I was not able to consult the original work.

<sup>38</sup> „... keine besondere Ursache haben, etwas zu verrichten, oben im Stocke in einem Klumpen auf, und suchen daher den allerkleinsten Raum, der möglich ist, einzunehmen.“

it can be observed within a beehive, “if they wanted to take up the largest space possible with their building”<sup>39</sup> (421)? Instead, he claims,

a young swarm of bees within an unsettled hive finds no base, onto which they could simultaneously build next to one another; rather, they begin with united force, to attach at the top the hanger of a future comb; they build the cells, or at least their base, not at once, not each for itself, but they continue with it, by and by, from the top into the empty space below. And how could a hindrance or reciprocal obstruction then occur for them not to move the walls of each cell as far into the empty space as they like? What external compulsion could determine and restrict the form of the cells?<sup>40</sup> (421–2)

Moreover, why or how should cylindrical animals by each pushing against one another to appropriate the biggest possible space end up with hexagonal combs as a result? To say nothing of the problem of how to account for the requirement of a worker to source new building material while a neighbour during the other’s absence would surely push into the vacant enclosure. (418–26)

Essentially, Reimarus intends to exemplify with his criticism that the manifoldness and variability of the behaviour that animals display cannot be explained strictly mechanistically, but that instead some inner principle must be at work that instructs and shapes animal behaviour in accordance with the conditions and circumstances of a specific situation. However, this does not mean that Reimarus has a less deterministic understanding of animal behaviour. Indeed, despite his scorching criticism, Reimarus does not reject mechanism as such, but that

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<sup>39</sup> „... zwünge sie, ihren Bau so nahe bey den andern anzulegen, wenn sie den möglichst größten Raum mit ihrem Gebäude einnehmen wollten?“

<sup>40</sup> „[Es ist vielmehr gewiß,] daß ein junger Bienenschwarm in einem ledigen Stocke keinen Grund vor sich findet, worauf sie zugleich beyeinander bauen könnten; sondern sie fangen mit vereinter Hülfe an, oben ein Hängewerk einer künftigen Scheibe anzukleben; sie bauen die Zellen, oder wenigstens den Grund dazu, nicht auf einmal, nicht jede für sich, sondern sie gehen damit, nach und nach, von oben in den ledigen Raum herunter. Und wie könnte denn da eine Hinderung oder Gegenhinderung Statt haben, daß sie nicht die Gränzen jeder Zellen in den ledigen Raum so weit hineinrückten, als sie wollten? Was für ein Zwang von aussen könnte die Figur der Zellen bestimmen und einschränken?“

Mr. Buffon, rejecting the design or final causes, and endeavouring to explain the instinct of brutes, and particularly the oeconomy of bees, in a mechanical way, gives no satisfactory or true explication of the matter: and this is all I said against him. (867–8, English original)

He even defends Buffon, together with Pierre-Louis Moreau de Maupertuis (1698–1759) and Rousseau. In a public letter against the subtitle the English translator of his *Natural Religion* added and which alleges that in the book *The Objections of Lucretius, Buffon, Maupertuis, Rousseau, La Mettrie and other Ancient and Modern followers of Epicurus are Considered, and their Doctrines Refuted*, Reimarus concedes that the subtitle “is injurious to the honour of these three gentlemen, whom I esteem for their merits, and is contrary to what I have expressed in my work” (867). His relationship to the mechanists hence proves rather complicated and ambivalent. While he indeed harbours nothing but contempt for someone like La Mettrie, whom he considers from a scholarly point of view to be presumptuous and ignorant, (cf. 383n2) he challenges mechanists like Buffon for “rejecting the final causes in the creation” (867, English original) and therefore the consequences of strict mechanism for God’s immediate presence in the world, not its consequences for the qualitative understanding of animal behaviour. Thus he objects in regard to Buffon how it would be possible to explain that the bees stay with their queen and that when they “do not see a queen or her brood, they do not build, collect, keep things tidy, but rather neglect their own lives, at least towards winter,”<sup>41</sup> (419) if it were not that a Creator has instilled within them the drive to do so, against all odds. Thus the worker bee, for instance,

neither to continue its life, nor to meet its lust, needs to follow a queen bee. Or even to remain with each other in one place. It could each for itself, separately,

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<sup>41</sup> „Wenn sie keine Bienenmutter, oder keine Brut von ihr sehen, gar nicht bauen, nicht sammeln, nicht Ordnung halten, sondern vielmehr ihr eigen Leben, wenigstens auf den Winter verwahrlosen?“

or with a few together, dwell, build, collect, and retain its life in a spacious corner according to its fancy.<sup>42</sup> (419)

While the very capability of bees to relocate would prove, against the mechanists, that their behaviour is not strictly limited by anatomical and physical conditions, the fact that they remain with the hive, Reimarus argues, would prove their actions nevertheless pre-determined and hence pre-conditioned by God. Because animals would perform the actions necessary to reproduce their lives in such a perfect manner, they can only spawn from a perfect, absolute reason, yet because they know how to perform them perfectly from birth, this perfection cannot be ascribed to the animals' "own considerations, experiences and exercises, ... instructions, example or models"<sup>43</sup> (379). This then proves for Reimarus as a consequence "an omnipotent mind, which proves the original source of all possible inventions and science, and which knew a means to implant into the blind nature of each creature that part each requires, as a skill,"<sup>44</sup> (380) and "one clearly sees the truth in its real occurrence, so that one can grasp it with one's hands"<sup>45</sup> (381) within consideration of the animal kingdom. Although Reimarus considers animal actions therefore to be controlled by more, as well as more complex and sophisticated elements than strict mechanistic theories, thus even conceding animals a sophisticated psychological inner life, his

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<sup>42</sup> „[Die gemeinen Bienen, das ist, die Werkbienen,] brauchten weder zur Fortsetzung ihres Lebens, noch zur Pflege der Wollust, einer Bienenmutter zu folgen. Oder auch bey einander an einem Orte zu bleiben. Sie können jede für sich, einzeln, oder mit wenigen zugleich, in einem geraumigen Winkel nach Gefallen wohnen, bauen, sammeln, und ihr Leben erhalten.“

<sup>43</sup> „...eigene Überlegungen, Erfahrung und Uebung, ... Unterricht, Beyspiel oder Muster...“

<sup>44</sup> „[Es offenbaret sich darinn] ein unendlicher Verstand, welcher aller möglichen Erfindung und Wissenschaft ursprünglich Quelle ist, und ein Mittel gewußt hat, der blinden Natur jeder Geschöpfe ihr benöthigtes Theil davon, als eine Fertigkeit, einzupflanzen.“

<sup>45</sup> „... sieht man die Wahrheit in ihrer Wirklichkeit klar vor Augen, daß man sie mit Händen greifen kann.“

conception carries the same consequences for animal behaviour as mechanism: animals behave, essentially, identically and non-voluntarily (see particularly 398–400). He simply exchanges divinely predetermined drives to orchestrate the lives of animals for a mechanistic principle.

However, the exact empiricism Reimarus levels against mechanism turns increasingly against his own assurance of the unconscious repetitiveness and perfection of animal actions as well. As an empirically inclined philosopher, Reimarus of course recognises “an infinite diversity”<sup>46</sup> (390) in form and application of organs and extremities, sizes and shapes, movements and reproduction when he talks about bodily and sensory appearance and constitution of animals. He declares that

in animals, according to their drives, no action happens to no purpose, inapt or amiss; and they have not one vain or false art, instead it is all indispensable to their and their species well being and needs, all perfect in their particular way. Their skills or arts are as diverse as their species thousandfold; nevertheless there is not one ignorant and imperfect animal in all species; all and every one are born artists and masters.<sup>47</sup> (391–2)

Yet through the lens of Reimarus’ examples, animal behaviour appears increasingly erratic, voluntarily and nonidentical, rather than identical. A Guinean monkey, for example, who was brought back to England on a ship,<sup>48</sup>

on seeing the sailors climbing on the lashings and masts, ... just as if to show that he mastered the art better, not only climbed the individual ropes, but in

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<sup>46</sup> „... [so findet sich doch selbst in dem Aehnlichen, nach jedes Thieres Art,] eine unendliche Verschiedenheit.“

<sup>47</sup> „Bey den Thieren hingegen geschieht, nach ihren Trieben, keine Handlung umsonst, ungeschickt oder verkehrt; und sie haben keine einzige eitele oder falsche Kunst, sondern es ist alles zu ihrem und ihres Geschlechtes Wohl und Nothdurft unentbehrlich, alles in seiner Art vollkommen. Die Fertigkeiten oder Künste bey ihnen sind so mancherley, als tausendfältig ihre Arten sind; dennoch ist kein einzig thier aller Arten in seinem Geschäfte unwissend und unvollkommen; alle und jede sind geborene Künstler und Meister.“

<sup>48</sup> Reimarus’ source for the story is the book *A Description of Some Curious and Uncommon Creatures* by the author Thomas Boreman (1739, 13).

swinging from one rope to the other, from one mast to the other, flung himself for thirty or even fifty feet through the air, and never missed.<sup>49</sup> (431)

Illustrating the higher skilfulness of animals over humans, the example signifies for Reimarus a higher reason and a drive at work that automatically inclines the monkey to infallibly perform his or her feats upon having been provided with a chance to do so. But the story does not quite add up. On the contrary, closely relating the monkey's behaviour to that of the sailors, Reimarus' very way of telling the story, quite unintentionally of course, highlights the ambiguity of animal behaviour and undermines the referral of the display of the behaviour in this particular situation to an instinctually instilled motivation, and thus automated predetermination. The customary refuge to introducing the behaviour "as if" does little to dispel such impressions. Instead, the monkey's behaviour appears rather mimetic than biologically obligated, and thus intimately and reciprocally engaging in his human counterfeit according to the individual context, suggesting some sort of reflexive engagement of the animal with its environment – as if the behaviour of the animal is not dictated by his or her drives at all, but arises from the animal mediating the specific situation and the animal's intimate and reciprocal engagement with the other primates on the ship. Rather than exemplifying the blind automation of animal behaviour, Reimarus indeed appears to try to come to terms with the monkey's proficiency over the human in climbing and to turn inferiority into virtue.

At other times, Reimarus even explicitly remarks deviations from the claimed uniformity of animal behaviour. For example, noting that spiders sometimes weave

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<sup>49</sup> „Wie er die Bootsleute an den Tauen und Masten klettern gesehen, hat er, gleichsam um zu zeigen, daß er die Kunst besser verstünde, nicht allein die einzelnen Seile beklettert, sondern sich auch durch sein Schwingen von einem Seile zum andern, von einem Maste zum andern, aufdreißig, bis funfzig Fuß weit, zur Luft geschleudert, und darinn nimmer gefehlet.“



their nets horizontally rather than vertically, he concludes that “all things considered, I do not believe that such things occur often”<sup>50</sup> (463). Instead of following up on the anomaly – scrutinising and verifying, or revising his conceptualisation – he merely brushes it away. Neither are such contradictions isolated instances. Reproduction proves according to Reimarus

in all its conditions a wonder of nature, and full of traces of a divine wisdom. ... When nature awakes in everyone, it is remarkable that every animal recognises its species’ mate, and distinguishes it from all the others, regardless of the striking resemblances among some species of four-footed animals, even more so among birds and fish, and the most among insects, that gives us humans, with all diligent observation, a great deal of trouble not to confuse one species with the other. If the animals therefore would not have a clear perception and distinguishing feature of their species, and the other sex of their species, and loved this one more than any other, a mad interbreeding would occur among animals, everything would degenerate, and many crossbreeds and deformed animals would be born into the world, which would run counter to the perfection and happiness of the living. That is why such *confusion of nature* is precluded by the infertility of such crossbreeds.<sup>51</sup> (477–9, emphasis added)

While empirical nature compels Reimarus to declare natural disarray, his explanation inevitably forestalls his claim for perfection in nature. His weapon against the

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<sup>50</sup> „[Und ich habe nachher selbst auf dem Platze hinter meinem Hause, wo die Leute Linien für die Wäsche geschoren hatten, ein hosrizontales Geweb einer gemeinen Spinne zwischen diesen Linien beobachtet.] Unterdessen glaube ich doch nicht, daß solches oft geschehe.

<sup>51</sup> „...ist in allen seinen Umständen ein Wunder der Natur, und voller Spuren einer göttlichen Weisheit. ... Wenn sich denn die Natur bey jedem reget: so ist dabey merkwürdig, daß ein jedes Thier den Gatten seiner Art kennet, und von allen andern unterscheidet, ungeachtet eine solche Aehnlichkeit unter manchen Arten von vierfüßigen Thieren, noch mehr aber unter den Vögeln und Fischen, und am meisten unter den Insecten anzutreffen ist, daß wir Menschen, mit aller sorgfältigen Beobachtung, Mühe haben, eine Art nicht mit der andern zu verwechseln. Wenn also die Thiere nicht von Natur ein klares Bild und Unterscheidungszeichen ihrer Art, und des andern Geschlechtes in ihrer Art, hätten, und dieses vor allen andern liebten; so würde eine wilde Vermischung unter den Thieren entstehen, alles nach gerade ausarten, und viele Bastarte und Misgeburten in die Welt gesetzt werden; welches der Vollkommenheit und Glückseligkeit der Lebendigen entgegen liefe. Daher denn auch solcher *Verwirrung der Natur* noch mehr durch die Unfruchtbarkeit solcher Bastarte vorgebeuget worden.“

mechanists, namely experience, turns against himself. The very existence of such crossbred anomalies (infertile or not) contradicts Reimarus' claim that animals possess perfect instinctual recognition of their own kind. Moreover, as he also acknowledges in a footnote to this section that

there are several crossbreeds among the four-footed animals of various species, as between a donkey and a cow in the barbaric world, out of what emerges a pack animal without horns, named Kumrah, and of which Shaw reports in his *Voyage dans plusieurs Provinces de la Barbarie et du Levant*.<sup>52</sup> (479–80n58)

Reimarus' willingness to accept these crossbreeds as somewhat regular occurrences, quite apart from the fact that they even seem to thrive in his description, means that crossbreeds prove more than mere "confusions of nature," even if Shaw's example could still be considered human tampering with God's perfection and thus rampant Creation. Another example is much more problematic in this respect.

Mister Gallen writes of the species of goats: These animals seem to have as much resemblance with sheep as donkeys with horses: and the billy goat covers the sheep just as readily as the ram, who being left with nothing meanwhile takes advantage of the goat. Occasionally these encounters result in degenerates, the species however remain always distinct.<sup>53</sup> (480n58)

In fact, a surprising regularity of exceptions and a large degree of erraticism manifests in the behaviour of the animals in these examples, tendencies that strongly contradict Reimarus' claim for perfection and invariability, or an innate pre-

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<sup>52</sup> „Unter den vierfüßigen Thieren verschiedener Arten giebt es mehrere Vermischungen, als von einem Esel und einer Kuhe in der Barbarey, woraus ein ungehörntes Lastthier, Kumrah genannt, entsteht, von welchem Shaw in seiner *Voyage dans plusieurs Provinces de la Barbarie et du Levant* ... Nachricht gibt.“

<sup>53</sup> „Der Herr Gallen schreibt ... von dem Ziegenbocks Geschlechte: Diese Thiere scheinen eben so viele Aehnlichkeit mit den Schafen zu haben als der Esel mit dem Pferde: und der Ziegenbock beleget das Schaf eben so gerne, indem sich der Widder unterdessen, wegen des Nachsehens wieder von der Ziege schadlos halten läßt. Zuweilen erfolgen davon einige Ausartungen, die Geschlechter aber bleiben dennoch immer unterschieden.“

programming of their behaviour that supposedly would do without any significant mediation of animal behaviour through the individual.

Most strikingly, this contradiction does not stop at nature, but also reflects back on Reimarus' central motive of proving God through natural philosophy. After all, within the logic of Reimarus' theology, any imperfection in nature ultimately has its source in God, challenging His omniscience and hence perfection. Reimarus' attempt to convey the presence of an omnipotent God through displaying the perfection of empirical animal behaviour hence points in fact unwillingly into the opposite direction: a certain erraticism and arbitrariness of the empirical world, which reveals the nonidentity of the empirical animal with itself and other exemplars of its species, and as a result exposes the goal of completely deciphering and demonstrating the predetermination of animal behaviour, along with the very idea of perfection, invariability and identicalness in nature as idealistic pretence. Reimarus' reinterpretation of the empirical examples achieves little in this respect and proves rather clumsy. Instead, animals surface as individually mediating the objective world, rather than evincing behaviour that would unfold identically according to fixed rules.

### **A Catalogue of Animal Abilities**

While the consideration of animal behaviour in *Instinct of Animals* and *Natural Religion* follows a theistic rationale that claims the possibility of discovering God's intentions within their behaviour to provide a path to a morally righteous life, Reimarus (1982, *Instinct of Animals* [1725], 759, 769; 1985, *Natural Religion* [1754], 381) also speaks of the marvel about what motivates their behaviour, or a general difficulty in grasping the animal, as an element in his intellectual pursuits. Animals and their behaviour, he concedes, put people in a state of amazed bafflement, "if not

about the corporeal structure of the world and its inhabitants, surely about their drives and arts”<sup>54</sup> (Reimarus 1985, *Natural Religion* [1754], 385–6). Even mechanists are prone to such amazement, revealing according to Reimarus just how limited their theories are to explain animal behaviour on the one hand, but also the ubiquitous power of God on the other, that even extends to infidels, regardless of their acceptance of God. While his amazement of and joy derived from occupying himself with animal behaviour indicate and redeem for Reimarus the promises of his theism, the recognition of wonder in the relationship to animals implies at the same time a psychological-epistemic undercurrent to this quality of animals to amaze humans similar to the one Descartes struggled with. They seem to evoke a spontaneous reaction in us that contradicts our understanding of humans as essentially different from animals as well as the view of animals as essentially identical exemplars; they defy our expectations and predictions, challenge and irritate us, and thereby provoke explanation or determination of their behaviour to restore our self-image as preponderant species. As if to affirm this influence, Reimarus (ibid., 387) indeed announces immediately after addressing wonder about animal behaviour, that he intends to devote a whole treatise to the behaviour of animals in the future – an exercise he deems necessary because although *Natural Religion* addresses animal behaviour to a significant extent it does so still exemplarily, demonstrating the God-giveness of their skills, rather than systematically exploring their ability to act.

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<sup>54</sup> „[Lasset sie so gar die Aufdeckung der göttlichen Wunder im Thierreiche verächtlich und lächerlich zu machen suchen: sie verrathen mehrentheils dadurch nur den letzten Versuch einer schon verzweifelnden Atheisterey, welche der Schulen, die ihnen diensamen und unwiderleglichen Lehren der Weisheit geben will, zu ihrem eigenen Verderben spottet. Und dennoch werden sie oft,] wo nicht bey dem körperlichen Baue der Welt und ihrer Einwohner, gewiß über die Triebe und Künste der Thiere stutzen, und in eine verwunderungsvolle Verwirrung gerathen.“

Making good on his promise (cf. 63–4),<sup>55</sup> in 1760 he publishes the first edition of *General Observations on the Drives of Animals, Mainly on their Art Drives*. With the second edition from 1762, the book was extended by an “Appendix of the Diverse Determinations of Natural Forces and their Various Degrees in Clarification of the Tenth Chapter,” although it is possible that this had already been enclosed with the remaining exemplars of the first edition some time in 1761 (Schmidt-Biggemann 1979, 63). A third edition from 1773 experienced a further expansion. Published posthumously by Reimarus’ son Johann, the latter compiled the “Commenced Observations on the Particular Classes of Animal Art Drives” from his father’s notebooks and records.<sup>56</sup> Indeed, whereas the *Drives*, albeit interspersed with empirical examples, develop the general, conceptual level of a theory of animal behaviour – hence its title *General Observations on the Drives of Animals* – it is the “Commenced Observations” that form the actual study of the spontaneous behaviour of animals. They remain in such a fragmentary and preliminary state, however, that they merely foreshadow the scale of Reimarus’ project, which would have amounted to nothing less than a complete yet rather descriptive catalogue of all behavioural patterns represented in the animal kingdom.<sup>57</sup> In contrast to *Instinct of Animals* and *Natural Religion*, the *Drives* hence provides a comprehensive examination of the

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<sup>55</sup> When not further specified, the referenced page numbers in this section hereafter refer to: Reimarus (1982, *Drives* [1760/2]).

<sup>56</sup> For my reading I rely on the 1982 facsimile of Reimarus’ *Drives*, which reproduces the edition from 1762, including the “Appendix of the Diverse Determination,” and is complemented by a facsimile reproduction of the “Commenced Observations on the Particular Classes” from the 1773 edition (cf. Reimarus 1982, *Drives* [1760/2], 57–8). Textual differences between the first and third edition are not taken into consideration in my analysis, as they are conceptually irrelevant for Reimarus’ ethology.

<sup>57</sup> Reimarus’ system of art drives comprises fifty-seven subclasses in total (see below). The “Commenced Observations” published by Johann Reimarus run to roughly a hundred pages, but remain exclusively within the very first subclass.

subject of animal behaviour, structured into three major classes of drives, which nevertheless, Reimarus stresses, intricately interrelate in both humans and animals and require each other to sustain each animal species' life (78). The first class represents mechanical drives [*mechanische Triebe*], which denote all those actions in the body that are executed without any active involvement of the soul. Imagination drives [*Vorstellungstriebe*] or the inclination of the soul to form and comprehend images of sensory impressions it receives from its senses, delineate the second class of drives. The class of spontaneous drives [*willkürliche Triebe*], compiles thirdly those drives which appear not determined by any external, physical force and describe all efforts "of the soul, to sustain through certain actions that, which according to its sensation and imagination promises pleasure, and to eliminate that, which threatens to bring displeasure."<sup>58</sup> (78) Such avoidance of unpleasant and advancement of enjoyable sensory experience is achieved either through natural drives [*natürliche Triebe*], that are drives instilled originally by God, or in captivity modified abnormal drives [*abartende Triebe*]. The natural spontaneous drives [*willkürliche Triebe*] again subdivide into the general drive of self-preservation [*allgemeiner Trieb der Selbstliebe*] and in particular drives [*besondere Triebe*], the latter of which Reimarus finally partitions in drives of affects [*Affektentriebe*] and art drives [*Kunsttriebe*]. (For an overview of Reimarus' schema, see 38, 65–6)<sup>59</sup>

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<sup>58</sup> „...ein Bemühen der Seele, dasjenige, was nach ihrer Empfindung und Vorstellung Lust verspricht, durch gewisse Handlungen zu erhalten, und was mit Unlust drohet, zu entfernen.“

<sup>59</sup> Reimarus (1985, *Natural Religion* [1754], 311; 1982, *Drives* [1760/2], 65) does not explicitly differentiate between the terms 'instinct' [*Instinkt*] and 'drive' [*Trieb*], at times using them interchangeably, additionally with the term 'effort' [*Bemühen*]. Preferences exist nonetheless, but shift. Thus, he relies in *Instinct of Animals* and *Natural Religion* chiefly on 'instinct' while adhering to 'drive' in the *Drives*. Considering that Reimarus was writing for a general as much as an academic

The book shifts the perspective from looking at animals through considering God's existence and intentions, to looking at God's intentions through the deciphering of the causes of animal behaviour, and hence realises Reimarus' prospectus from *Natural Religion's* fifth chapter. Although it ultimately aims to lead to improved recognition of God and ourselves, the *Drives* almost exclusively consists of developing and discussing a theory and system of animal drives. Thus already within the preface to the work, the scientific consideration of animals by far outweighs theological considerations, (63–76) while the application of the knowledge of art drives to the recognition of God and ourselves spans a mere forty-one of the book's 413 pages. Indeed, it is the art drives that represent Reimarus' actual focus of the book, and which he deals with "in particular classes according to the special demands of the various ways of life"<sup>60</sup> (65–6). As before, Reimarus intends to

show, from the animal powers and from the features of the art drives, that they do not consist in a skilfulness, which the animals acquired themselves through experience or reason, or even a degree of reason, but that they are inborn

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audience, the reason for the later preference of 'drive' might be owed to the fact that the term '*Trieb*' was more commonly used in Germany in the sixteenth century than '*Instinkt*.' (Cheung 2008, 96; Jaynes and Woodward 1974b, 144–5)

<sup>60</sup> „[Wie man also durch den Trieb, in seinem weitläufigsten Umfange, alles natürlich Bemühen zu gewissen Handlungen versteht: so habe ich erstlich, bey den Thieren, die mechanischen Triebe von den Vorstellungstrieben und willkürlichen Trieben unterschieden. Die Vorstellungstriebe gehen theils auf das Gegenwärtige, was einen Eindruck in die sinnlichen Werkzeuge macht, theils auf das Vergangene, welches die thierische Einbildungskraft, auf eine verworrene Weise, unter das Gegenwärtige mischet. Die willkührlichen Triebe entspringen zwar alle aus der sinnlichen Lust oder Unlust; sind aber entweder bloß natürliche, oder abartende Triebe. Die natürlich-willkührlichen Triebe unterscheide ich in den allgemeinen Trieb der Selbstliebe, und in besondere Triebe: die besondern wiederum in Affectentriebe und in Kunsttriebe. Diese letzteren, worauf mein Zweck eigentlich gerichtet ist, habe ich denn ferner § 85.] nach den verschiedenen Bedürfnissen der Arten des Lebens, in besondere Classen abgetheilt“ (65–6).

Making up just 49 of the *Drives'* 413 pages, Reimarus deals with both mechanical and imaginal drives rather cursory. Almost the entire rest of the treatise is dedicated to indistinct and in particular art drives, that is 273 of 306 pages. Only within the final 41 pages does he turn to deducing a Creator from the art drives.

faculties, which develop out of the animals' predetermined forces of nature.<sup>61</sup>  
(66–7)

Both the particular drives and their specific manifestation within different species

hence first rely on

the particular and sophisticated tools for their special performances; second, their predetermined and keener sensual perception and imagination, for example that this particular thing smells and tastes good for them; where to add also the agreement within their sensual mechanism, that the pleasing or unfavourable sensation, through a to us hidden influence, moves certain limbs; third, their predetermined inner sensations, partially of their bodily composition, powers and tools, partially also of the determined natural effort of the soul; and fourth, the predetermined blind dispositions of the soul itself.<sup>62</sup>  
(66)

Based on the interaction of drives and particular physical organisation of each animal species, in the *Drives* Reimarus therefore develops an ultimately deterministic theory chiefly of such animal behaviours that appear to humans the most intentional.

The way Reimarus leads up to animals' art drives – sifting out all the actions obviously performed unconsciously by human and non-human animals – alongside his focus on the art drives and on proving their pre-determinacy, suggests that he particularly tries to come to terms with those animal activities, which most closely resemble humans and suggest that animals direct their behaviour somehow

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<sup>61</sup> „Ich zeige, aus den thierischen Kräften und aus den Eigenschaften der Kunsttriebe, daß sie nicht in einer Geschicklichkeit bestehen, welche sich die Thiere selbst durch Erfahrung und Vernunft, oder auch durch einen Grad der Vernunft, erworben hätten; sondern daß sie angeborene Fertigkeiten sind, welche aus den determinirten Naturkräften der Thiere entstehen.“

<sup>62</sup> „Dahin rechne ich eines Theils ihres determinirten Mechanismus besonderer und geschlanker Werkzeuge zu besondern Verrichtungen; zweytens, ihre determinirte und schärfere sinnliche Empfindung und Vorstellung, daß ihnen z. B. dieses gewisse Ding gut riechen und schmecken muss; wohin auch beyder Uebereinstimmung in ihrem sinnlichen Mechanismo zu rechnen ist, da die angenehme oder widrige Empfindung, durch einen uns verborgenen Einfluß, gewisse Gliedmaßen rege machete; drittens, ihre determinirte innere Empfindung, theils der körperlichen Beschaffenheit, Kräfte und Werkzeuge, theils auch des bestimmten natürlichen Bemühens der Seele; und viertens die determinirten blinden Neigungen des Seele selbst.“



spontaneously and self-mediate their actions to some degree. This primary interest suggests itself first because actions displaying particularly ingenious abilities prove most astonishing, and hence show for Reimarus particularly vivid the presence and work of a higher Creator, while also having the potential to generate the largest admiration for Him. Second, however, these intriguing displays of animal ingenuity and skilfulness pose the biggest mysteries, most strikingly suggest animals' individuality and self-mediation, make them appear essentially indeterminable, and move them closer to humans. As a consequence, they become the most necessary to determine in order to secure our superiority and control. Indeed, considering the contradictions that arise between empirical animal behaviour and Reimarus' claim for its predetermination and the epistemological uncertainty he excavates in *Natural Religion* on the one hand, and on the other hand the *Drives*' focus on such activities that appear particularly individual, intricate and sophisticated, the book seems a product of coming to terms with the indetermination in respect to the erratic behaviour of animals as much as, and maybe even more than, his claim of identifying God's intentions.

Not in any way systematically observing animal behaviours himself, Reimarus primarily relies on literary accounts for his project.<sup>63</sup> Since domesticated and forced behaviours, including those traits of animals living freely within a cultural environment, do not provide any clear exposure of the Creator as they represent behaviours that have been altered or affected by humans rather than having originated from a pristine natural drive, Reimarus therefore focuses on behaviour which animals display in nature. Yet, academic observers would usually be restricted

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<sup>63</sup> For an overview of the authors Reimarus relied on in compiling the *Drives*, see the generated bibliography in Reimarus 1982, volume II, pp. 744–56.

to observations within cities – since the era of the large, organised Modern natural-historical expeditions as, for example, represented by Darwin and Humboldt had not yet started in Reimarus' time – or, in the case of royal collections of exotic animals, limit themselves to anatomical studies of dissected bodies, not the portrayal of their ways of life. According to Reimarus, however, animals' original and natural behaviours could best be observed in remote, secluded and unspoiled areas and hence by "hunters, travellers, bird catchers, fishermen," who would have the most and best opportunities for "observing large, wild and foreign animals"<sup>64</sup> (73). As a consequence, Reimarus complements the scientific literature with "books on hunting, travelogues, and reports of any knowledgeable naturalist who resides in the country,"<sup>65</sup> (74) not just academic ones. Additionally, insects provide the majority of examples for his examination, since they are supplied with especially many art drives, Reimarus explains, but are also the animals most readily observable by his readers. (72–5; Cheung 2006, 143)

Despite this focus, Reimarus' concept of the animal covers

all those living creatures, which express in an organic body sensation and spontaneous [*willkürliche*] movement; among which humans themselves also count; even though usually the word, animals, is only considered in respect to unreasonable ones. Sensation is the first spark of life, and consists in an awareness of things present; at least an inarticulate awareness. When we humans now recognise as our soul the entity within ourselves which becomes

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<sup>64</sup> „[Allein solche Herren haben in ihren Städten nicht so viel Gelegenheit,] großen, wilden und zumal fremden Thieren nachzulauschen, als Jäger, Reisende, Vogelsteller, Fischer, Pächter: [und in den Beschreibungen fremder Thiere, welche in königlichen Tierbehältnissen gefüttert werden, habe ich mehr Beobachtungen von den Theilen ihres zergliederten Körpers, als von ihrer Lebensart, gefunden.]“

<sup>65</sup> „[Wie nun die Lebensart der größeren Thiere noch nicht so genau von Kunstverständigen erforschet ist, als der kleineren: so habe ich geurtheilet, daß ich mich bey deren Beschreibung nicht bloß an die Herren Academisten binden, sondern auch] Jagdbücher, Reisebeschreibungen, und eines jeden auf dem Lande sich aufhaltenden verständigen Naturforschers Zeugniß, [mit gehöriger Behutsamkeit, zu Rathe nehmen müßte.]“

sensible of the things, may this awareness be articulate or inarticulate: then we also have to grant all other animals beside us, by dint of their sensation and awareness, a soul.<sup>66</sup> (77)

The body, in turn, is a tool of the soul, which supports the sensory being of animals in a mechanical, yet ultimately indistinct way and brings external things to the soul's attention (77–8). Within this interrelation, mechanical drives comprehend those activities that derive from “a thing's mere powers of movements, the rules of movement and the way its parts are joint together”<sup>67</sup> (80). Although they might affect the soul at times and vice versa, their central quality is that they nonetheless occur independently of any conscious, active involvement of the soul, including any influence of drives. Among these, Reimarus counts in particular all vital functions of the body, which do not require any sensation or perception, but also the bodily suppositions for the soul's sensations and perceptions. Even though a sensitive plant similarly performs such mechanical acts, (80) animals in fact differ from such plants, and indeed human artefacts, in respect that they also have a soul, which is intricately interlinked with the body and its mechanical drives, although in a way yet unknown to humans, and that they have sensations: “I will not speak incorrectly if I say that the lives of animals only begin with sensation, or, that an animal only begins to be an

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<sup>66</sup> „Das Thierreich auf unserm Erdboden fasset alle diejenigen lebendigen Geschöpfe in sich, welche in einem organischen Körper Empfindung und willkührliche Bewegung äussern; wozu der Mensch selbst auch mit zu rechnen ist; wiewohl wie gemeinlich unter dem Worte, Thiere, nur die unvernünftigen verstehen. Die Empfindung ist der erste Funken des Lebens, und besteht in einem Bewußtseyn gegenwärtiger Dinge; wenigstens einem undeutlichen. Wenn wir Menschen nun dasjenige Wesen in uns, welches sich der Dinge, es sey deutlich oder undeutlich, bewusst ist, für unsere Seele erkennen: so müssen wir auch allen andern Thieren neben uns, vermöge ihrer Empfindung und ihres Bewußtseyns, eine Seele zustehen.“

<sup>67</sup> „...welche durch die bloßen Bewegungskräfte eines Dinges, den Regeln der Bewegung und der Art der Zusammenfügung gemäß...”

animal, and to differ from an inanimate plant, once it is sentient”<sup>68</sup> (85). The mechanical functioning of the body thus describes the most basic vegetative functions and provides the precondition for the soul to interact with the material world, both in respect to receiving sensations from it as well as interfering with it. (79–90)

As organisms with souls, animals also have sensations, shaped in correspondence to the specific sense organs they have. When external things stir the senses in such a way

that the movement reaches as far as the brain, it results always in a natural effort of the soul to imagine the things according to the sensual impression, that is to create an image of them, which lets one realise them, as objects, as outside and in front of oneself.<sup>69</sup> (92)

These powers of imagination in animals though, he clarifies, are fundamentally different from human imagination, thus delimiting non-human from human animals. In contrast to the latter, animals are not capable of distinguishing between past and present imaginations; rather, they arbitrarily conflate past and present sensations in their imagination. He supports this claim with observations of how his dog would start growling and biting his tail when someone gently touches or strokes it. Reimarus ascribes this behaviour to past incidences of ill-treatment, where pulling his tail inclined him to chase the perpetrating hand. These past experiences still prompt him to chase even the friendly hand, “regardless of the fact that no one has

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<sup>68</sup> „Ich werde nicht unrecht sagen, daß das Leben der Thiere erst mit der Empfindung anfangt, oder, daß ein Thier erst in so fern anfangt, ein Thier zu seyn, und sich von leblosen Pflanzen zu unterscheiden, als es empfindlich ist.“

<sup>69</sup> „...daß die Bewegung bis ins Gehirn dringt, so erfolgt allezeit ein natürliches Bemühen der Seele sich die Dinge nach der Art des sinnlichen Eindrucks vorzustellen, das ist, sich ein Bild davon zu machen, das sie, als einen Gegenstand, außer sich und vor sich stellet.“

imposed this buffoonery on him in all those years he has spent in my home”<sup>70</sup> (104).

As the dog does not overcome his disposition, Reimarus disputes an ability of animals to distinguish the past and present images and compare them, that is, to reflect on them to recognise their difference. Nonetheless, Reimarus recognises an ability to remember past impressions. Rather than clear remembrance however, he ascribes this to the degree of vividness certain impressions have reached in the animals’ souls due to repetition. The more often a certain experience is represented in the imagination, the stronger it evokes yearnings in the animal.

Thus, a dog knows and distinguishes his master from other persons. The present view and smell of his master renews past similar impressions of his senses, and concurrently the benevolence of his master, which cannot emerge at the sight and smell of another person.<sup>71</sup> (108)

Attributing animals therefore with memory, but not with clear and active recollection of past events, Reimarus concludes that animals “perceive the characteristics of objects not within the objects themselves, in as far as they are attributes present in them, but in their experienced impression”<sup>72</sup> (108). Because of this and since they are not capable of comparing different impressions – a prerequisite for building concepts

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<sup>70</sup> „...ungeachtet man ihm den Pössen, in denen vielen Jahren, die er in meinem Hause zugebracht, nimmer gespielt hat.“

<sup>71</sup> „[So kennet ein Pferd die alte Herberge. Denn unter die Vorstellung des gegenwärtigen Hauses oder Stalles, wo es vor dem eingekehret, mischet die verworrene, aber lebhaftige Einbildungskraft, die Vorstellung des vorigen guten Futters. Das ist nunmehr in einer und derselben Vorstellung des Pferdes unter einander enthalten und gegenwärtig. Folglich erwecket es auch bey ihm einerley sinnliche Begierde; welche aber von andern Oertern nicht entstehen kann, die dergleichen vergangene Vorstellung nicht erwecken.] So kennet und unterscheidet ein Hund seinen Herrn von andern Personen. Das gegenwärtige Anschauen und der Geruch von seinem Herrn erneuert die vergangenen ähnlichen Vorstellungen dieser Sinne, und zugleich der Wohltaten des Herrn, welches bey dem Anblicke und Geruche von einer andern Person nicht entstehen kann.“

<sup>72</sup> „Sie nehmen die Merkmaale der Dinge, nicht sowohl in den Dingen selbst, in so fern sie derselben beywohnende Eigenschaften sind, als in ihrem empfundenen Eindrücke, wahr.“

– animals accordingly neither have conceptual understanding nor the capacity to form general concepts of objects.<sup>73</sup> Their actions are guided simply by past experiences that create expectations according to those experiences, not abstract recognition of their similarities. When a dog, for example,

wants to enter or exit through a door, which stands open only a thumb wide, and he achieves opening it by scratching with his paws or jumping against it, he will also scratch another time, when the door is shut and he wants it to open, in expectation of a similar case. If someone then opens the door, one confirms his linked imagination, and he will always scratch when he wants to enter.<sup>74</sup> (117)

Such imagination that remains indistinctive and reacts to current situations according to similar experiences in the past, not by reflexive scrutiny, would even allow for inventiveness of animals, but these inventions nevertheless rely on or have their source in purely incidental and sensory experiences, not rational, analytical understanding, according to Reimarus. Thus, even though it appears to us as if animals would reason, their behaviour really does not require any mental abilities that would exceed indistinctive imaginations. Although animals, unlike plants, possess sensation, imagination, memory and even inventiveness, these abilities therefore differ qualitatively from their human versions. Animals lack independent, general knowledge of things, not because they have no language, which deprives them of abstract concepts; rather they are deprived of language because they cannot abstract. Their imaginary powers remain in the realm of the sensory, neither

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<sup>73</sup> Perceptions of something qualify as concepts (or notions, ideas) for Reimarus, when we are clearly aware of both, that we are perceiving or imagining and the perception itself (111).

<sup>74</sup> „...ein Hund zur Thüre herein oder hinaus will, die nur einen Daumenbreit offen steht, und daß er die Oeffnung mit dem Ankratzen der Pfoten oder mit einem Anspringen bewirkt: so wird er ein ander mal, wenn auch die Thüre zu ist, die er offen haben will, in Erwartung des ähnlichen Falles, ankratzen. Thut ihr ihm denn einmal die Thüre auf: so bestätigt ihr seine verknüpfte Vorstellung, und er wird so oft ankratzen, als er herein will.“

intellectually nor reflexively mediating the experiences they have. Animals concern themselves merely with the current. If past events interfere with current events, this only happens through biographical disposition, not conscious remembrance. (126–7)

Explaining on the one hand how mechanical drives sustain the body without any need for self-mediating involvement of the soul and how the representational drives of animal imagination provide animals (human and non-human) principally with the capability to adjust their activities in response to external objects on the other, his explications of mechanical and imagination-drives prove a mere necessity in Reimarus' ethology (79). Reimarus merely concerns himself with them because they are pre-requisite to the very possibility of spontaneous drives [*willkürliche Triebe*] to take effect through the body's and imagination's specific configuration and conveyance of external impressions to the soul, while simultaneously establishing the necessary presence of a soul and sensations within non-human animals. Continuing his examination of animal behaviour, however, Reimarus reconfirms that

when I ascribe an indistinctiveness [*Willkür*] and spontaneous drive [*willkürlichen Trieb*] to unreasonable animals, I do not mean that they govern themselves according to distinct imagination of two alternatives, and after well-considered realisation of the best, by free choice ... Yet the animal drive, which is called spontaneous [*willkürlich*], is nevertheless not just mechanical and bodily, but consists in an inclination or disinclination of the will in response to antecedent, though indistinct imagination, that is to the experience of sensuous pleasure and displeasure, from which originate spontaneous [*willkürliche*] actions, according to the inclination and disinclination.<sup>75</sup> (127–8)

Spontaneous [*willkürliche*] actions of animals might have

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<sup>75</sup> „Wenn ich den unvernünftigen Thieren einen Willkühr und willkührlichen Trieb beylege: so verstehe ich dadurch nicht, daß sie sich nach einer deutlichen Vorstellung beyder möglichen Fälle, und nach überlegter Einsicht des Besten, aus freyer Wahl, bestimmen ... Aber der thierische Trieb, welcher willkührlich genannt wird, ist doch auch nicht bloß mechanisch und körperlich, sondern besteht in einer Neigung oder Abneigung des Willens, auf vorgängige, obgleich undeutliche Vorstellung, nämlich auf die Empfindung sinnlicher Lust und Unlust; woraus denn willkührliche Handlungen entstehen, die der Neigung oder Abneigung gemäß sind.“

the appearance of free choice between two possible actions. Alone, the spontaneous [*willkürliches*] behaviour of animals has in this case indeed merely the quality of an analogy, or distant resemblance with our free choice in its effect, as the stronger sensuous impression and stimulus deflects the wavering drive, according to indefinite imagination, just as well as the distinct realisation of the prevalent good and bad of our reasonable choice.<sup>76</sup> (131)

Reimarus' circumstantial qualification regarding the arbitrariness of the drive elucidates the central problem in his venture. Although animals obviously behave in a way that appears individual and nonidentical, he assures that this is not in any way the case, yet their behaviour is not just attributable to mechanical functioning either. Rather than determining their actions through careful consideration, thinking and reason, Reimarus specifies instead that the motivating force of animals to take certain actions is directed by pleasure or joy, and displeasure that stems from the exciting of the senses on the one hand and affective disposition by past experiences on the other, alongside the innate configuration of spontaneous drives [*willkürliche Triebe*]. This disposition is natural, unequivocal and identical, meaning spontaneous drives [*willkürliche Triebe*] are, "by dint of nature and the specific being of every species, by itself, in full freedom of the animals" – as opposed to their behaviour in captivity – "always effective in the same way"<sup>77</sup> (133). But they can diverge from this natural efficaciousness, attenuating or even modifying in response to extraordinary circumstances or certain constraints. Such changes can be induced, Reimarus

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<sup>76</sup> „...das Ansehen einer freyen Wahl aus zweoen möglichen Handlungen. Allein, in der That hat das willkührliche Betragen der Thiere in dem Falle nur eine Analogie, oder entfernte Aehnlichkeit mit unserer freyen Wahl, in der Wirkung: weil der stärkere sinnliche Eindruck und Reiz ihrem wankenden Triebe, nach undeutlicher Vorstellung, eben sowohl einen Ausschlag giebt, als die deutliche Einsicht des überwiegenden Guten und Bösen, bey unserer vernünftigen Wahl.“

<sup>77</sup> „...vermöge der Natur und des Wesens jeder Thierart, von selbst, in der vollen Freyheit der Thiere, stets auf einerley Weise wirksam...“



exemplifies, by alterations in the environmental conditions due to animals living among people, or through deliberate human conditioning. (133–5)

What Reimarus hereby accounts for in his theory is of course a common and difficult to reject awareness of the fact that animals in captivity obviously behave differently in comparison to their wild counterparts – but Reimarus' discussion of abnormal behaviours proves problematically ambiguous. Although he determines that spontaneous (and in fact all) drives [*willkürliche Triebe*] govern each species' behaviour in principle exclusively and always in one and the same way, he nonetheless simultaneously allows for variance (and has to by experience) under certain conditions. Certainly, he limits such conditions to anomalous human interference with animals in his examples, that is to say the restriction of the freedom of animals to act out and follow their drives. Modification of drives due to domestication, however, necessarily implies the same possibility for feral animals, since domestication does not turn individuals into another species, raising the question why animals in the wild exclusively adhere to their drives under conditions of change in the environment, rather than the drives mutating to facilitate altered conditions. Whereas animal behaviour in the wild is supposed to provide reliable access to God's intentions exactly because of its apparent invariability, the general potential of drives to change contradicts this claim fatally. Reimarus cannot take the permanence of drives in wild animals for granted if external forces prove capable of interfering with the drives' qualities – a possibility he obviously accepts. Instead, the assumption that all behaviour of animals in the wild would be static proves a rather arbitrary and hopeful insinuation. While the category of abnormal drives, by signifying human-induced changes within God's creation and therefore making them

identifiable, is meant to bring under control undeniable changes within the behaviour of animals that contradict the total invariability of animal behaviour and thereby reconfirm its stability, the category itself actually undermines the very argument of the identity of animal behaviour it is supposed to save. Instead, a class of abnormal drives provides a conceptual container for deviant, nonidentical behaviour to impose such behaviour with a blanket determination despite its indeterminableness. The dismissal of experiences of domesticated animals for the determination of the essential qualities of animals in turn invalidates any claims that might stress the similarities between animals and humans derived from everyday experiences of domesticated animals. Thereby, animals are kept conceptually separated from humans and any memory of our own naturalness that might arise from experiences of animals repressed.

Indicative of these conceptual problems is that Reimarus does not discuss the matter of deformed drives in any detail, but moves straight on to the discussion of natural drives, at the centre of which resides a general drive of self-preservation that describes the striving of every individual without exception to promote its preservation and wellbeing through love of itself. The reason for this is that it can be most consistently traced back to some of the oldest accounts on animal behaviour handed down from the Stoics (among them Cicero, Laërtius and Chrysippus), apparently proving the drive's permanence. As the most basic drive for all animals, self-preservation determines all of their actions and is realised through numerous, species-specific, particular drives. But according to Reimarus, this creates a problem, which the Stoics somehow overlooked: if animal behaviour is centrally affected by their drive to sustain themselves, how is the care for offspring to be explained, which

often verges on selflessness? Indeed, the case of reproduction proves both the limitation of mechanistic approaches to plausibly account for animal behaviour, inasmuch as explaining it in terms of responses to pleasure and displeasure caused by external stimuli, as well as the necessary determination of animal behaviour by drives. While the mating act itself still can be explained in mechanistic terms, the devotion and love animals show for their young – such as the tireless efforts of birds to gather food and the foresight of building nests for their fledglings, or the almost self-sacrificing efforts of bees and ants to care for and defend the larvae, often quite literally with their own lives – proves impossible to reconcile with mere external stimulation.<sup>78</sup> Quite the contrary, the physical demand to care for offspring not only promises displeasure but seems even deterring in respect to the parents' own benefits. Neither can they anticipate the benefits of the investment into the reproduction of their species in the future, because they cannot distinguish past and present. Yet “how is it actually” that particularly the mothers “do not content themselves with getting rid of this burden” – the eggs or young ones – “as an excretion, without concerning themselves with it any more”<sup>79</sup> (142)? Exactly this contradiction reveals according to Reimarus that blind, innate drives are at work within non-human animals. Because animals are incapable of rationalising the situation, there must be an inner disposition or determination urging them to dedicate so much energy to the care of their young. “It is imperative to set for this a necessary inner sentience of a blindly determining inclination and an impression that

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<sup>78</sup> Such examples, Reimarus corroborates, will be even more plentiful when eventually turning to art drives.

<sup>79</sup> „Woher kommt es denn, daß sie [vor allem die Mütter, AK] sich nicht begnügen, dieser Bürde [Eier oder Junge, AK] nur als eines Unflathes los zu werden, ohne sich weiter darum zu bekümmern?“

proves pleasant and which emerges from this”<sup>80</sup> (143). Rather than driven by clear in- and foresight or even compassion, non-human animal parents are obscurely compelled (one might say urged) to care so passionately for their offspring by natural disposition. (See particularly the *Drives*’ §42, 145–6)

Depending on their cause, Reimarus subdivides spontaneous [*willkürliche*] actions further into those caused by “affects, that is, by an impetuous sensuous inclination and disinclination” on the one hand, and those showing artistic skills or craftsmanship, “that is, regular dexterity in certain actions”<sup>81</sup> on the other (147). The former are exclusively activated by sensuous joy and indistinct imagination, and they merely add intensity to both inclinations and disinclinations. In ways that are absolutely unrelated to reflection, human and non-human animals are completely alike in their affects. Hence, Reimarus does not go into details about this class of drives. Fundamental differences between humans and non-human animals (in contrast to mere differences in appearance or degree) show only, consequently, in the composition of art drives, and more specifically in the way humans and animals arrive at and initiate artistic skills. This is what sets humans completely and absolutely apart from other animals. “The difference is in the artistic skills alone,” Reimarus specifies, “in that we invent them or at least learn them through our own powers of mind, and have to acquire them through diligent exercise, whereas animals

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<sup>80</sup> „Es muß hierzu nothwendig eine innere Empfindung von einer blindlings determinirten Neigung und eine daraus entstehende angenehme Vorstellung gesetzt werden.“

<sup>81</sup> „... Affecten, das ist, durch eine heftige sinnliche Neigung oder Abneigung [zu unseren willkührlichen Handlungen getrieben] ... Künste, das ist, regelmäßige Fertigkeiten in gewissen Handlungen ...“

do not require all that”<sup>82</sup> (147). Instead, animals can blindly rely on their sensual drives, firstly because animals

are not capable and determined for any other than sensuous happiness; secondly, because their senses are sharper and more infallible in their aim than ours; thirdly, because their innate art drives compensate both for their lack of reason, and for whatever their mere affects do not suffice.<sup>83</sup> (160)

Thus, while the central impetus of all animals is self-love (and an urge for self-preservation arising from it) or in Reimarus’ terms the propelling of “sensory happiness,”<sup>84</sup> (163) the achievement and implementation of this ultimately depends solely on art drives, which are the skills to properly and best utilise the body and external materials in the service of this aim:

Despite all these merits of the external senses, which make animals their way to sensuous happiness easy, they still would not be able to fulfil the purpose of their nature, if they did not also, apart from their general basic drive of self-love, and aside from their particular drives of affection, which both are stimulated to effect by external sensations, have natural art drives. After all, it is one thing to recognise from the sensual stimulus that something is good, and therefore carry yearning for it; another, to know the means and fashion to arrive at it, and set them in motion with dexterity. ... and a general positive inclination towards one’s self and species, if it immediately erupted in a violent affect, would not help animals, were they not provided with a particular skilfulness, to choose the best and shortest means to their purpose, and apply them with sufficient dexterity.<sup>85</sup> (163–4)

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<sup>82</sup> „Allein, bey den Kunstfertigkeiten ist der Unterschied, daß wir sie durch eigene Verstandeskkräfte erfinden oder doch lernen, und durch fleißige Uebung erwerben müssen; da hingegen die Thiere solches alles nicht nöthig haben.“

<sup>83</sup> „...weil sie zu keiner andern, als einer sinnlichen Glückseligkeit, fähig und bestimmt sind: zweytens, weil ihre Sinne, in der Absicht, schärfer und untrüglicher sind, als die unserigen: drittens, weil ihre angeborenen Kunsttriebe dasjenige ersetzen, was ihnen an Vernunft mangelt, und was durch ihre bloßen Affecten nicht würde ausgerichtet seyn.“

<sup>84</sup> „... sinnliche Glückseligkeit ...“

<sup>85</sup> „Bey allen diesen Vorzügen der äußerlichen Sinne, welche den Thieren ihren Weg zur sinnlichen Glückseligkeit leicht machen, würden sie doch den Zweck ihrer Natur lange nicht erfüllen können, wenn sie nicht, außer dem allgemeinen Grundtriebe der Selbstliebe, und außer den besondern Affectentrieben, welche beyderseits durch äußere Empfindungen zur Wirksamkeit gereizet werden, annoch natürliche Kunsttriebe besäßen. Denn es ist ja ein anderes, an dem sinnlichen Reize erkennen, daß etwas gut sey, und also darnach Verlangen tragen; ein anderes, die Mittel und die

Humans in contrast, due to their lack of enough art drives, have to rely on reason to develop the skills themselves, although they often do so with much less perfection than animals.

Indeed, it is this very advantage of non-human animals before humans in practical things, which signifies for Reimarus the existence of innate art drives and their prevalence in non-human animals. To support his claim, he elaborates in the following the inevitable necessity of innate skills of animals, renders these skills as essentially artisanal, and exposes the reasons for their diverse appearance and manifestation in different species, before finally devising and characterising his classification system for animal behaviour. While humans are exceedingly vulnerable when they are born and need much time and practice to develop and acquire skills, crafts and arts to maintain their lives, moths for example are born equally naked and vulnerable to the elements, yet, according to Reimarus, they, or more accurately their larval form, “not only feel the malaise of their nakedness from the outside, but also experience an internal artisanal effort to weave a dress, and subsequently, when it pinches, undo it and insert a patch in both places.” Such an achievement could not be possible without the anticipating genius of the larva’s mother, however, who “already proved the skilfulness to push the egg into a place in which the grub could instantly

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Art wissen, wie man dazu gelangen könne, und selbige mit Fertigkeit ins Werk setzen. ... und eine allgemeine gute Neigung zu sich selbst und seinem Geschlechte, wenn sie gleich in einen heftigen Affect ausbräche, würde doch den Tieren nichts helfen, wofern sie nicht mit einer besondern Geschicklichkeit versehen wären, die besten und kürzesten Mittel zu ihrem Zwecke zu wählen, und sie mit genugsamer Fertigkeit anzuwenden.“

find material for its clothes, and food for its nourishment.”<sup>86</sup> (166) Displaying another supple skilfulness, an antlion,<sup>87</sup>

which barely can move itself in the thin sand, mines backwards a hollow funnel, to await passing and towards it sinking ants, and other similar vermin, or to throw a dug out rain of sand on them and bring them down to it.<sup>88</sup> (167)

These examples highlight first and foremost the necessity for animals to possess a certain skilfulness, adroitness or dexterity in their behaviour to be able to realise their general drive of self-preservation in practical involvement with their environment according to their bodily configurations. Animals require well-developed, sophisticated skills, if they are to survive. Yet, as Reimarus has pointed out numerous times before, “experience teaches us that in particular in the choice of foods and the spouse an animal does not err”<sup>89</sup> (162). Referring to his examples (he also mentions hermit crabs and spiders), he also assures his readers with the same repetitiveness that individuals follow such activities as soon as they are born or hatched, despite lacking both experience and instruction at the time. Both the

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<sup>86</sup> „Sie fühlet nicht allein die Ungemächlichkeit ihrer Blöße von außen, sondern sie empfindet auch innerlich bey sich ein kunstfertiges Bemühen, sich ein Kleid zu weben, und solches nachmals, wenn es zu enge werden will, oben und unten aufzutrennen, und an beyden Orten ein Stück einzuflicken. Ihre Mutter aber hat schon die Geschicklichkeit gehabt, das Ey dahin zu schieben, wo sie Stoff zur Kleidung, und Futter zu ihrer Nahrung, zugleich finden konnte.“

<sup>87</sup> The name antlion broadly refers to a metamorphic, winged insect of the family *Myrmeleontidae*. Strictly speaking, the term only refers to the larva though, who's behaviour Reimarus describes in this section. They are also sometimes referred to as doodlebugs in North America and have a presence in cultural history that dates back to Antiquity.

<sup>88</sup> „...welcher sich kaum selbst im dürren Sande fortschieben kann, minirt in demselben rücklings einen hohlen Trichter, um die etwa dahin kommenden und hinunter sinkenden Ameisen, und anderes dergleichen Gewürme, darinnen zu erwarten, oder mit einem ausgeschaukelten Sandregen zu beschütten und zu sich herunter zu bringen.“

<sup>89</sup> „Nun lehret die Erfahrung, insonderheit in der Wahl der Speisen und des Gatten, daß sich ein Thier darinnen nicht triegt.“

infallibility and immediacy of such actions confirm, according to Reimarus, the innate predetermination of their skills. (166)

While Reimarus' argument already proves questionable in *Natural Religion*, the more conceptually focussed *Drives* adds a new level to the tension. Reimarus obviously makes a huge epistemic assumption in order for his argument to be valid by concluding very generously from a very small number of examples that among all representatives of every non-human species none would show significant changes and individuality in its behaviour. Indeed, Reimarus appears to select his examples according to his preconceived assumption that animals are creatures moved innately according to divine programming. Rather than carefully observing and comparing different specimens in order to get to the bottom of their behaviour, his examples neatly support his claim for God's determination of animal behaviour. Insects work particularly well in this respect, as they seem obviously to act spontaneously [*willkürlich*], yet their behaviour does not evoke a strong sense of similarity with human behaviour, the very feature Descartes also struggles with; they are much more easily perceived as determined and pre-programmed, and also as identical within species, than for example mammals, in which individual traits are recognised much more easily. More importantly, however, although insects may very well show and possess innate actions, this does not by any means prove that their behaviour is exclusively predetermined, or that their innate skills would not change over the course of their lives. Instead, it seems that Reimarus wrestles with the expertise and individuality animals display in practical things and the damage this experience does to our self-image as being the pride of Creation. Reading the superiority of animal skills over humans as indicators of their lack of freedom allows Reimarus to convict



animals of actual inferiority and to restore human superiority against apparent evidence which suggests otherwise.

The contradiction Reimarus faces in his attempt to prove spontaneous [*willkürliches*] animal behaviour rigidly pre-determined, is his simultaneous recognition of and intention to capture the ingenuity, sophistication and intricacy of animal behaviour, both because that is how people experience animals and their practical abilities, but also because nothing less would be expected from an omnipotent Creator. As a consequence, he cannot simply reject any reason or ingenuity from the behaviour that animals display, especially if that behaviour is to display God's perfect reasoning. Instead, the designation of their behaviour has to encompass the presence of reason, and even a higher (albeit external) reason than humans possess. On the other hand, and necessarily so for his proof of God to take effect and to retain human superiority, he characterises animals exactly by the uniformity and consistency of their behaviour, withholding any intentionality, spontaneity or individual mediation from the animal that would be essential to their behaviour.

Defining "art," quite oddly, as a "regular skill in spontaneous [*willkürlichen*] actions, which leads to a certain purpose, and yet incurs manifold variations,"<sup>90</sup> (170) Reimarus determines the intricate behaviour animals display, based on its alleged repetitiveness and the observation that their constitution allows them to deviate from the particular way they execute their actions, as "innate arts"<sup>91</sup> (171). Because

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<sup>90</sup> „Eine regelmäßige Fertigkeit in willkürlichen Handlungen die zu einem gewissen Zwecke führen, und doch vielfältige Abweichungen leiden, nennet man Kunst.“ – Unfortunately, or rather indicatively, Reimarus provides no source for his definition of art.

<sup>91</sup> „... angeborene Künste ...“

animals furthermore deploy these arts unintentionally for the fulfilment of their needs, that is for their species' preservation and well-being, they qualify as naturally occurring art drives.<sup>92</sup> Considering the attention paid to aesthetics and art as topics in eighteenth century German philosophy following the publication of Alexander Baumgarten's *Aesthetics* (1750–8), with Kant's *Observations on the Feeling of the Beautiful and Sublime* (1764) and later the *Critique of Judgement* (1790) as well as Hegel's lectures on aesthetics and his thesis of the 'end of art,' Reimarus' definition proves rather peculiar. Indeed, his simultaneous emphasis on both regularity and variety suggests that his idiosyncratic definition of art actually functions as

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<sup>92</sup> Continued from previous footnote: "Since animals, by dint of nature, possess such regular skilfulness in their arbitrary actions for their and their species' preservation and well-being, where manifold deviance would be possible: they therefore possess by dint of nature certain innate arts. And since every animal has a natural striving, that is a drive, to exercise their innate arts to satisfy its needs: hence animals have, each one according to its species, certain natural artistic drives, which make them able, to apply the particular means with a regular skilfulness for their and their species' preservation and well-being. / Because we humans predominantly have nothing but acquired skills and arts: one therefore pushes into the essential concept of skills and arts commonly that they are skilfulness, which we have acquired through diligent practice. Alone the cause of a thing, and the way of its emergence, actually adds nothing to its essential concept. Because of this the plants and animal bodies are just as much machines as clocks, even though they are not made by human hands, but originate in nature." (170–1)

[„Da nun die Thiere, von Natur, in ihren willkührlichen Handlungen solche regelmäßigen Fertigkeiten zu ihrer und ihres Geschlechtes Erhaltung und Wohlfahrt besitzen, wo an sich vielfältige Abweichungen möglich wären: so besitzen sie von Natur gewisse angeborene Künste. Und da jedes Thier ein natürliches Bemühen, d. i. einen Trieb hat, seine angeborenen Künste zu seinen Bedürfnissen auszuüben: so haben die Thiere, jedes nach seiner Art, gewisse natürliche Kunsttriebe, welche sie geschickt machen, die besondern Mittel zu ihrer und ihres Geschlechtes Erhaltung und Wohlfahrt, mit einer regelmäßigen Fertigkeit anzuwenden. / Weil wir Menschen mehrentheils lauter erworbene Fertigkeiten und Künste haben: so schiebt man gemeinlich in den wesentlichen Begriff der Fertigkeiten und Künste mit hinein, daß sie Geschicklichkeiten sind, die wir uns durch fleißige Uebung erworben haben. Allein die Ursache eines Dinges, und die Art seines Entstehens, thut eigentlich nichts zu seinem wesentlichen Begriffe. Die Pflanzen und thierischen Körper sind darum doch eben sowohl Maschinen, als die Uhren, ob sie gleich nicht durch Menschenhände gemacht, sondern von Natur entstanden sind.“]

conceptual tool to manage the fundamental tensions surfacing within his attempts to comprehensively determine animal behaviour. But while 'art' seems to capture perfectly both the intricacy of the behaviour animals display and the grandiosity of their Creator, the concept also carries problematic baggage. It evokes references to special capabilities of the individual who produces the artworks, something particularly holding true for the eighteenth century that saw the rise of the artist-subject as individual genius, (Wallace 2013) through the connotation of subjectivity, individuality, ingenuity, deliberation, intentionality and a special sensitivity other people lack – qualities Reimarus exactly is concerned to keep separated from animals, if not per se from their behaviour. Whereas he requires the ingenuity of the artist to do God justice, he needs to suppress at the same time any assumption of the animal as an artist itself. Against Reimarus' appropriation of the concept of art and attempts to appropriate it for his ethology, his concept of the art drive develops a momentum of its own and resists his intentions. Countering first the dilemma in unequivocally determining animal behaviour through his rigid and rather technocratic definition of art, he secondly covers up the contradiction that carries from the determination of empirical animals over into his concept of the art drive by claiming that "the cause of something, and the way of its genesis, has actually no meaning for its essential concept"<sup>93</sup> (171). Thereby, Reimarus conceptually separates the artisanal skills animals actually display from the commonly accepted cause of such skills, inheriting the for his project productive meaning of the term art while discharging detrimental connotations. Reimarus thus seems to break the spell between undeniable ingenuity of animal behaviour and trust in animal self-will. In contrast, assumptions that

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<sup>93</sup> „Allein die Ursache eines Dinges, und die Art seines Entstehens, thut eigentlich nichts zu seinem wesentlichen Begriffe.“

animals would self-acquire their skills or arts, he explains, would be fuelled by wrongly inscribing the act of acquisition to the concepts of arts and skills just because humans acquire their arts and skills rather than inherit them by nature; the correspondence between Descartes' and Reimarus' argumentative approaches is obvious. The animal in Reimarus' concept of the art drive emerges hence as God's material; God is the true artist, whose art manifests through the animal.

Not only does Reimarus ignore, or at least, eschew the aesthetic debates of his time, he also rejects established understandings of art and instead tries to develop a completely separate concept of art that freely but rather awkwardly submits the term 'art' to his particular conceptual needs. Thus Reimarus' concept of art drives proves not only fraught with tensions between his definition of art and the general concept of art, but also between the abstract concept of art and the empirical phenomenon of spontaneous [*willkürlichem*] animal behaviour he denotes with it, that is between artistic individuality and intentionality on the one hand and the claimed automation and identity of animal behaviour on the other. Recent commentators generally tend to ease these tensions by interpreting the concept of art drive rather in ways that compare to the idea of crafts, thereby taking his definition of art at face value and overruling any reference to animal artistry or artisanship (Franz and Müller 2011, 114; Cheung 2006, 144; Bowler 2005, 31; Jaynes and Woodward 1974b, 148). However, this reading not only ignores Reimarus' deliberate terminological choices – after all, the term '*Handwerk*,' for example, already was available to him, yet he settled for art and art drive, instead of '*Handwerkstrieb*,' that is craft drive – reinterpretation of his art as craft or skilled drives also merely reproduces the conceptual dilemma in a different configuration. Whereas 'art' adheres to individuality through the

connotation of artistic genius, 'craft' evokes ideas of deliberation, rationality, learning and practice. Both arts and crafts evoke impressions of intentionality, individuality, gradual acquisition of skills and self-activity, and hence bring animal behaviour much closer to the idea of freedom and nonidentity than Reimarus is prepared to tolerate. Thus, Reimarus' art drive, considered as either crafts-like or artistic, remains utterly contradictory. Interpreting the art drives as craftiness merely clouds the problem and circumvents the dilemma in determining animal behaviour and settles for a particular, canonical understanding of animal behaviour that lines up with a long tradition of rendering their actions identical and determined, rather than unsteady, nonidentical and spontaneous. Instead, Reimarus' manoeuvres within his concepts of art and the art drive point towards difficulties in the determination of animal behaviour as identical and automated, which he tries to control through conceptual redefinition, and they foreshadow a rift in Reimarus' determination especially of spontaneous [*willkürliches*] animal behaviour that continues to deepen the further he progresses with his examination. Even his very own category of the art drive turns against Reimarus' strictly pre-determined ethology.

Breaking down the huge diversity of manifestations of animal behaviour, Reimarus introduces finally the category of "modes of life" [*Lebensarten*] as basis for the classification of the particular art drives of animals (177–86; cf. Cheung 2006). The modes of life [*Lebensarten*] capture the different compositions and qualities of each species' body and soul in their correspondence with the environmental conditions each animal encounters and is adapted to. "The elements wherein animals can live and move," Reimarus explains, "are air, water, earth and the airspace. Each

one again has its various differences”<sup>94</sup> (179). Air, for example, can be of different “thickness and heaviness, elasticity, warmth or cold, humidity or dryness,” while there is “salty and fresh, deep and shallow, standing and flowing, clear and muddy, hard and soft water”<sup>95</sup> (180). These diverse conditions shape the particular needs, and physical configuration of every species.

When we now consider the different needs, which every mode of life [*Lebensart*] causes, we will discover in them the key why the animals, due to lack of experience, instruction and higher brain powers, have been imbued with natural and hereditary artistic abilities, why every species received these and no other art drives, and why many a species were allocated substantially more arts than others, so that we generally find patterns of wise inclinations much more widespread in the lowest worms and insects than in four-footed animals, since the formers’ needs, according to the way and brevity of their lives, are greater and more divers.<sup>96</sup> (186–7)

Art drives, consequently, spawn and guide spontaneous [*willkürliche*] movements, which are necessary for animals and in fact their best means to satisfy their needs. According to Reimarus, this intricate interlocking is obviously orchestrated by God, who, although not initiating every single action in the world, sets the gears in motion in such an ingenious and anticipatory way, that they continue to elapse indefinitely.

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<sup>94</sup> „Die Elemente, worinnen Thiere leben und sich bewegen können, sind Luft, Wasser, Erde und der Luftkreis. Jedes hat wiederum seine mancherley Verschiedenheit.“

<sup>95</sup> „[Andern Theils aber ist die Luft von mancherley] Dicke und Schwere, Elasticität, Wärme oder Kälte, Feuchtigkeit oder Trockenheit. ... So gibt es auch salzige und süß, tiefe und seichte, stehende und fließende, klare und trübe, harte und Weiche Wasser ...“

<sup>96</sup> „Wenn wir nun die verschiedenen Bedürfnisse in Betrachtung nehmen, welche jede Art des Lebens mit sich bringt: so werden wir darinnen den Schlüssel finden, warum den Thieren, bey dem Mangel an Erfahrung, Unterrichte, und höheren Verstandeskräften, natürliche und erbliche Kunstfertigkeiten eingepflanzt sind, warum jede Thierart diese und keine andere Kunsttriebe bekommen, und warum mancher Thierart weit mehr Künste zugetheilt sind, als andern; so daß wir gemeinlich, bey den geringsten Würmern und Insecten, viel häufigere Muster weiser Anstalten, als bey den vierfüßigen Thieren, antreffen, weil jener Bedürfnisse, nach ihrer Art und Kürze des Lebens, größer und vielfältiger sind.“

Based on the conceptual framework of the mode of life [*Lebensart*], Reimarus introduces a classificatory system (216–22)<sup>97</sup> for sorting the various behavioural patterns and particular art drives present in the animal kingdom, which follows their central needs and the means to satisfy them:

I Class of animal art drives: of movement, as the most general means for all purposes.

1. The skilfulness in the movement of the whole body from one place to another, in different elements, according to the different builds of the body, in various ways.
2. The skilfulness in the movement of particular limbs for different applications and advantages, which these tools can provide.

II Class of the art drives, which are means to the first major need of commodious air in the right element, and the right region.

3. The skilfulness, with which animals find their right element when they are born outside it.
4. The drive, to venture into an adjacent element, that is, from water onto land, or from both into the free air, or from land into water.
5. The drive, to change ones primary element in order to alter the whole mode of life [*Lebensart*].
6. The drive, to move from one climate and region to another against the change of the seasons and weather, and to return: 1) with birds, 2) with four-footed animals, 3) with insects, 4) with fish.
7. The sensation of the approaching weather, and all the accordingly following doings.
8. The drive, to bury and wall up oneself for hibernation.

III Class, of the art drives to obtain the second major need, namely conducive and sufficient nourishment.

9. Skilfulness to search and choose suitable nourishments.
10. Skilfulness to handle and prepare the foods to suitable nourishments.
11. Skilfulness to employ one's powers and tools to obtain the natural foods.
12. Cunning, art and agility of predators when catching, hunting, fishing.
13. Skilfulness to await the time of day for feeding and catching.
14. Skilfulness to carry together foods, store them and use them thrifty in reserve for the winter.

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<sup>97</sup> A digitalised German version of Reimarus' classificatory system of drives can be accessed through the Max Planck Institute for the History of Science, Berlin, at: [echo.mpiwg-berlin.mpg.de/MPIWG:K9B1WD2U](http://echo.mpiwg-berlin.mpg.de/MPIWG:K9B1WD2U), p. 164-169, retrieved 22.12.2014.

IV Class, of the art drives for the prevention of evil from lifeless things.

15. Skilfulness to avoid the dangerous elements, and depths.
16. Skilfulness to remove the adhering dirtiness, the smell and filth, as well as the dead.
17. Skilfulness to heal injuries and wounds.
18. Skilfulness to apply remedies against illness.
19. Skilfulness to dress and cover.
20. Skilfulness to find a comfortable and save place of residence, and rediscover it from a far and long distance.
21. Skilfulness to build or dig out a comfortable dwelling.
22. Skilfulness to shed one's skin.
23. Skilfulness of insects to spin a web around themselves for their complete metamorphosis, to cover, to bury themselves against cold, moisture, fall, paralysis and other hazards.

V Class, of the art drives for the prevention of evil from other animals.

24. Skilfulness to know and avoid one's natural enemies.
25. Animal's awe of humans.
26. Clever avoidance of pursuit and chase.
27. Deployment of natural weapons in defence, and skilfulness to attack ones enemy's weaknesses.
28. Joint defence.

VI Class, of the art drives for the well-being and preservation of the species, on the side of the parents in mating.

29. Distinguishing knowledge of the female sex and the species.
30. Skilfulness to make, understand and differentiate a certain call.
31. Skilfulness to take up the most comfortable position in mating, and to strike the reproductive organs.
32. Mating: polygyny: polyandry.
33. Love and willingness of the spouses towards each other.

VII Class, of the art drives of parents in respect to the care of and catering for their brood and young.

34. Different way of reproduction, and general provision of the egg-laying mothers, who's young subsequently can look after themselves.
35. Provision of the spawning fish and egg-laying amphibians.
36. Provision of the insects in laying their eggs.
37. Provision of birds, especially in building different nests, and certain numbers of eggs.
38. Skilfulness and zeal of birds incubating the eggs: of four-footed animals to bite off the umbilical cord.
39. The birds' and all other animals' vigour and cunning to defend their young.
40. Zeal of all animals to feed or to suckle their young.
41. Rearing [*Erziehung*] and weaning the young.



VIII Class of the art drives of the young that see the light of day.

42. Skilfulness of the young sealed in the egg to hack through, or to gnaw through the shell, and especially to do so in the right place.
43. Skilfulness of the four-footed animals and cetaceans to suckle on the breasts.
44. Skilfulness of the young to understand the call and warning cry of the mother, and to follow her.
45. Various innate, and immediately at the beginning of the life in response to the first needs manifesting artistic skills.

IX Class, of societal drives.

46. Drive to general gregariousness from various causes.
47. Knowledge of ones species and ones fellow citizens.
48. Natural languages of animals among each other.
49. Republic of the bees.
50. Republic of the wasps.
51. Republic of the ants.
52. Republic of the beavers and other animals.
53. Societies, which only persist for a certain time.

X Class of the further determination and alteration of the natural drives.

54. More accurate determination of the natural drives according to the circumstances.
55. Alteration of the drives because of extraordinary fortuities.
56. Alteration of the drives through human constraint and taming.
57. Alteration of the drives through human art and training.

While he offers the qualification that “if not all, [I] have included at least the most principal art drives of animals in this order of classes,” this qualification is accompanied by the request that “if something is forgotten in there, I thankfully will recognise it, if I am reminded of it”<sup>98</sup> (222). In principle, Reimarus proceeds according to the ambition to provide exhaustive systematisation of animal behaviour (Scherer 1898, 153). The spontaneous [*willkürlichen*] skills are supposed to be completely standardised, providing a prerequisite for turning the animal into a containable and controllable entity. Although he omits elaborating further on the classes’ specific

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<sup>98</sup> „Ich denke, daß ich, wo nicht alle, doch wenigstens die vornehmsten Kunsttriebe der Thiere unter dieser Classenordnung befasset habe. Wenn aber noch etwas darinnen vergessen wäre, so werde ichs mit vielem Dank erkennen, wenn ich daran erinnert werde.“

characters – a task left to the “Commenced Observations on the Particular Classes of Animal Art Drives” of which only brief preliminary extracts were published by Reimarus’ son and which remained unwritten at large – rather than being decisive, however, the classes’ circumscribable headings appear astonishingly approximate, even evasive and transient. Skills of movement are determined merely as showing themselves “in various ways” and “for different applications and advantages” (classes 1 and 2), while class 45 clusters “various innate” artistic skills that come into effect at the time of birth. Likewise, all other classes remain rather vaguely contoured, leaving room for a plethora of particular manifestations of means for animals to pursue their needs and desires. Instead of delimiting animal behaviour to standardised patterns, Reimarus’ characterisation seems indefinite and open. Drives “to venture into an adjacent element” (class 4) and “to change one’s primary element,” or “to alter the whole mode of life [*Lebensart*]” (class 5) even, introduce elements of undesignated change that unsettles the static foundation of his system. Animals’ building of “societies, which only persist for a certain time,” (class 53) implies a similar dynamism in animal behaviour. Cleverness to avoid overpowering by predators (classes 26 and 39) and the latter’s cunning in outwitting their prey nevertheless (class 12) further enhance animal behaviour by individual reckoning. Skilfulness “to heal injuries and wounds” (class 17) and economically manage, rather than merely indiscriminately set up one’s hoards during the winter months, (class 14) include capacities of anticipation, as well as assessing and planning in response to individually changing situations. Such exemplification of deliberation in animal behaviour also breaks through in the anthropomorphic language Reimarus engages to describe animal behaviours and which speaks of animal “republics” and “citizens,”

and grants animals not only “knowledge” and “language,” but also “love and willingness” towards one another. Although he is not in any way identifying non-human with human animals, it seems Reimarus cannot help but revert to such terminology to adequately express the intricacy and deliberation of non-human animals’ lives. Accounting for the modification of drives with a whole set of classes (X) finally, it is not just Reimarus’ system that proves fluid but the very category of art drives itself. Against his assurance, his system thus paints a picture of animal behaviour as reacting and adapting spontaneously to specific challenges and conditions, and thus as flexible, instead of given. Indeed, Reimarus’ ethology remains deeply ambiguous and his system of art drives appears more as an attempt to classify the unclassifiable or to mark out animal behaviour with identical measure and order, rather than an actual, comprehensive and decisive record of animal behaviour.

Nonetheless, or maybe exactly because of the indecisiveness of his system, Reimarus, upon further detailing the general characteristics of art drives, claims that each species would have neither “unnecessary or superfluous”, nor “alien, false or wrong” art drives. No species would perform acts, which are not suited to its needs, nor have art drives, “which would behove much better for a different mode of life [*Lebensart*] than its own, as consequently it would not serve its own species’ preservation and well-being, but rather go against the same”<sup>99</sup> (224–5). Furthermore, “all individual animals of one species, when they are free, act in their art drives

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<sup>99</sup> „Keine Thierart hat unnöthige und überflüssige Kunsttriebe. ... Kein einzig Thier hat von Natur fremde, falsche und verkehrte Kunsttriebe: d. i. solche, welche sich für eine andere Art des Lebens vielmehr, als für die seinige, schickten, folglich zu seiner und seines Geschlechtes Erhaltung und Wohlfahrt nicht dienetten, sondern derselben vielmehr entgegen wären.“

according to one and the same manner, rule and model, at least in the main"<sup>100</sup> (233). Thus, there is neither any noticeable difference in the art drives of "one and the same particular species, in the main parts, between countries and nations," nor are they "further perfected by its progeny"<sup>101</sup> (234). In the same manner, "no new arts arise among animals,"<sup>102</sup> (234) no old ones get lost, and none deteriorate. Rather, "every animal shows the art drives of its species from the first time, with a completely constant dexterity, without previous instruction, practice or bungling"<sup>103</sup> (235). Drives and animal behaviour hence prove unmediated by history, experience, chance or learning. Even those drives obviously testifying to some development of animal behaviour – such as drives that only manifest from a certain age onwards or only once in a lifetime – are completely predetermined, since they also appear in all individuals of one species in the same way and with perfect dexterity, as he assures his readers in §94 of the *Drives* (242–3). "Accordingly, these art drives also are not appropriated through exercise, but predetermined within nature itself to develop at a certain time,"<sup>104</sup> (242) and neither through mimicry or even teaching through a parent or other older conspecific. In keeping with his insistence upon God as the

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<sup>100</sup> „Alle einzelne Thiere einer Art handeln, wenn sie frey sind, in ihren Kunsttrieben nach einerley bestimmten Weise, Regel und Modell, wenigstens in dem Wesentlichen.“

<sup>101</sup> „[Man bemerkt daher nicht, daß die Kunsttriebe] einer und derselben besondern Art, in den Hauptstücken, nach Ländern und Nationen verschieden sind, oder von den Nachkommen zu einer weiteren Vollkommenheit gebracht werden.“

<sup>102</sup> „Es kommen auch eben so wenig neue Künste unter den Thieren auf, als alte verloren gehen, oder schlechter werden.“

<sup>103</sup> „Eine jedes Thier äußert die Kunsttriebe seiner Art, gleich das erste mal, mit einer völligen regelmäßigen Fertigkeit, ohne vorgängige Anweisung, Uebung, oder Brudeley.“

<sup>104</sup> „Demnach sind auch diese Kunsttriebe nicht durch Uebung erworben, sondern in der Natur selbst von ferne bestimmt, daß sie sich zu ihrer Zeit entwickeln müssen.“

drives' Creator, and in a way very similar to Descartes, Reimarus considers nature as finite and the non-human animal individual as a mere exemplar of its species.

Yet Reimarus' qualifications, made in passing, that individual animals act identically "at least in the main," and that likewise art drives between populations would not differ "in the main parts" – that is animals act uniformly only in essence – break up the determinism of his ethology, as they contradict his assertion of the rigid homogeneity of animal behaviour, and uncover his system as a sham. His concessions here open up the potential for deviance of the particular animal from the objective rules or fixed conditions of its drives and species, introducing a tension between Reimarus' identical species-behaviour and the individual, actual, empirical objects. The incidental remark "that all that remains for" animals to determine in their behaviour "is to distinguish incidental constitutions,"<sup>105</sup> (233) puts his concept of the predetermined animal altogether at stake. Empirical examples that Reimarus cites to support his claim of the identicalness of animal behaviour, instead have the effect of instancing empirical animals resistant to any classification that intends to provide more than an approximate and provisional order. Birds construct their nests, for example, following one model

in the same fashion with all individual birds completely similar, and it is generally certain that they choose a concealed secure place for it, where they find food for their young close by; yet that this particular tree, and this particular branch of it, is being picked for it, that they turn a piece of moss or a blade of grass, or a hair, a feather, or many of such kind together, into a soft draw sheet for their young – that depends on the circumstances of the particular place, what they find at first and most comfortable.<sup>106</sup> (249)

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<sup>105</sup> „So daß ihnen bloß zufällige Beschaffenheiten verschiedentlich zu bestimmen überbleiben.“

<sup>106</sup> „Das Modell der Vögelneester ist zwar in derselben Art bey allen einzelnen Vögeln ganz einerley, und es ist überhaupt gewiß, daß sie einen verborgenen sichern Ort dazu wählen, wo sie in der Nähe Futter für ihre Jungen finden; aber daß dieser Baum,

Experience urges Reimarus to acknowledge the individual divergence from the general unification due to specific circumstances. Although he obviously does not hesitate to accept this, his attempt to reconcile this rift between his claim for the uniformity of animal behaviour and the disparity of empirical behaviour remains rather vague, and in fact complicates the issue more than it clarifies it. Thus, he explains: "I ignore innumerable other examples, wherein one can clearly see that, according to the circumstances, the animals determine their actions slightly differently from the usual"<sup>107</sup> (251). But they only do so "in such a way, that the applied means have a general similarity with the usual [means] of their drive, which is not difficult to comprehend from the expectations of similar cases, and from the ideas of an animal wit"<sup>108</sup> (251–2). Granting animals wit seems surprising within the context of Reimarus' ethology though. In the early eighteenth century, the German term '*Witz*,' similar to the English 'wit,' stands for ingenious and clever ideas, whilst '*Witz*' finds general application predominantly in the arts and represents especially in Reimarus' field of literature poetic inventiveness par excellence (Grimm and Grimm 1960, 14.2:862). Far from a coincidence, the term seems an obvious and indeed adequate choice within the context of his art drives that almost imposes itself, while re-emphasising at the same time qualities of deliberation and self-mediation.

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und dieser Ast desselben, dazu ausgesucht wird, daß sie ein Stück Mooß oder einen Grashalm, oder ein Haar, eine Feder, oder viel dergleichen durch einander, zum weichen Unterbette ihrer Jungen machen, das kömmt auf die Umstände des Ortes an, was sie am ersten und bequemsten finden."

<sup>107</sup> „Ich übergehe unzählige andere Beyspiele, darinnen man deutlich sehen kann, daß die Thiere ihre Handlungen etwas anders, als gewöhnlich, nach den Umständen bestimmen."

<sup>108</sup> „... jedoch so, daß die angewandten Mittel eine allgemeine Aehnlichkeit mit den gewohnten ihres Triebes haben; welches aus der Erwartung ähnlicher Fälle, und aus den Einfällen eines thierischen Witzes, nicht schwer zu begreifen ist."

Reimarus' terminology continues to turn against himself and to point towards the nonidentical.

However, rather than providing an explanation for the divergence in the nests forms, Reimarus declares it trivial, reducing it to a difference in superficial appearance at most, which in any way remains insignificant for the constitutive influence of the universal drive. It is a universal and pre-established programming, not the idiosyncratic mediation of particular situations and circumstances that individual animals perform, which apparently proves decisive. In this fashion, Reimarus relies on and upholds the idealistic primacy of the universal over the particular, suggesting that essentially any particular divergence has no meaning and effect for the universally determined behaviour of animals. Without turning Reimarus' phrase: "ideas of an animal wit" into reason, however, the phrase unintentionally signals some sort of deliberate, active cognitive, possibly even self-determined and inventive, but at least a somewhat undetermined mediation by the animal, that counteracts and relativises the notion of a perpetual and constant determination of animal behaviour. Furthermore, it is not evident why more importance should be attached to the universal tendency in this context than its specific and individual implementation through the particular animal. On the contrary, when Reimarus, prompted by August Johann Rösel von Rosenhof's (1705–1759) *Insect-Amusement* (*Insecten-Belustigung*, 1746–61), damages the cocoon of a pupating "grass grub," he observes that the animal "always pauses for a while, as if, due to this act of violence, it would be peevish to continue constructing; alone, after a short while it resumed to patch up the torn bits, and to continue in its construction

anew”<sup>109</sup> (253). In the same manner, he describes how Réaumur “also had the curiosity to open the nest of a leaf-wrapping solitary earth bee, to take a look at it, and rebuild it as well as it was possible for him”<sup>110</sup> (254). However, when the bee returned, “noticing a disruption of its work, [it] reluctantly flew off again at first, but soon returned and undid”<sup>111</sup> (254) the damage. In these accounts, Reimarus’ language continues to be ripe with references to animal cognition, taste, individual preferences and deliberate choices, but even more telling is the fact that the animals specifically react to the unexpected, utterly chaotic and in its specific effect unpredictable intrusion. Although it may not be particularly astonishing to realise that animals in fact are confronted with chance and fortuity in their lives, and that accordingly they have to be able to react spontaneously to this, such reactions have to rely, as these examples show, on some mediation by the individual, even though such a reaction might not be guided by reason. Curiously, the way Reimarus paraphrases his examples – especially his reproduction of Réaumur’s bee experiment – makes the occurrence of such processes of evaluation, careful consideration and decision within the animals almost palpable, despite Reimarus’ insistence on the drives’ blind automatism.

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<sup>109</sup> „Wenn ich bisweilen, zum Zeitvertreibe, einer solchen Raupe, während ihres Baues, zugesehen, und etwas von ihrem angefangenen Gebäude eingerissen habe, so hat dieselbe zwar allezeit etwas eingehalten, als ob sie, wegen dieser Gewaltthätigkeiten, verdrießlich wäre weiter fortzubauen; allein, nach einer kleinen Weile fieng sie darnach wieder an das Zerrissene zusammen zu flicken, und aufs neue in ihrem Baue fortzufahren.“

<sup>110</sup> „[Eben gedachter Naturforscher] hatte auch die Neubegierde, das Nest der blattwickelnden ungeselligen Erdbienen zu öffnen, zu besehen, und so gut, als es ihm möglich war, wieder herzustellen.“

<sup>111</sup> „[Da denn die Biene, bey ihrer Wiederkunft,] eine Stöhrung ihrer Arbeit merkend, erst unwillig wieder heraus geflogen, bald aber wieder gekommen, und alles in den vorigen Stand gesetzt.“



Whereas animal behaviour thus manifests as individually mediated, rather than universally determined, Reimarus even openly contradicts his own argument for the perfection of animal behaviour, which is supposed to substantiate or even prove his claim for the pure innateness and predetermination of animal behaviour:

When the animals themselves occasionally diverge from the regular rule of their artwork, they try to compensate for their mistake by subjoining and removing. However exact a measuring artist bees may be, they still cannot ensure that their discs do not run sometimes somewhat on a slant, or once in a while come a few lines<sup>112</sup> closer to each other, than an exactly parallel spacing would allow, or that the blades of the cells, and the degree of their conflation, infrequently differ somewhat from the exact measurement. For so many work on one and the same piece, without draft and rule, apart from the one, which they have in their head; and the error of half a line or degree only becomes noticeable in progress. But it is to the honour of the bees, that they know to corner again at the right time, and to remove at one place what's too much at the other, and in the inverse manner to add again at one place, which was too few at the other.<sup>113</sup> (255–6)

More importantly still, in Reimarus' description the bees appear even reflexive, since at some point they themselves realise, and indeed have to realise their departure from the correct measurements in order to be able to correct it and readjust the discs. Furthermore, animals not only show slight imperfections in their skills, even

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<sup>112</sup> A *line* is an outmoded unit of measurement, which equals  $1/12$  English inch (prior to 1824).

<sup>113</sup> „Wenn die Thiere zuweilen selbst von der regelmäßigen Vorschrift ihres Kunstwerkes unvermerkt abgewichen sind: so suchen sie solchen Fehler wohl durch Nachgeben und Einlenken wieder gut zu machen. So genaue Meßkünstler auch die Bienen sind: so können sie doch nicht verhüten, daß ihre Scheiben nicht manchmal etwas schief laufen, oder hin und wieder einander um einige Linien näher kommen sollten, als ein genauer Parallelabstand erlaubte; oder daß die Blätter der Zellen, und der Grad ihrer Zusammenfügung, nicht oft von dem genauen Maaße etwas abweiche. Denn es arbeiten so viele an einem und demselben Werke, ohne Riß und Maaßstab, außer demjenigen, welchen sie im Kopfe haben; und das Versehen einer halben Linie oder Grades wird erst in dem Fortgange merklich. Aber es ist den Bienen Ehre genug, daß sie zu rechter Zeit wieder einzulenken wissen, und was an einem Orte zu viel ist, am andern wieder abnehmen, und so umgekehrt an einem Orte wieder zulegen, was an dem andern zu wenig war.“

unrestrained in their behaviour they “can sometimes also err in their drives”<sup>114</sup> (256).

The “earth bee,” (257) for example, builds cells in her burrow for each egg from trimmed leaves. Reimarus tells his reader how Réaumur observed a bee that

has begun to cut off a piece from the leaf, and sometimes even has progressed quite far with it, but has abandoned such subsequently, and rushed to another leaf, either because it was mistaken in the seemliness of the leaf, or because it did not meet the incision quite right. A mistake that a human could also easily commit, but which certainly proves, that it acts according to a limited imagination, and not as machine.<sup>115</sup> (257)

Accordingly, it is no surprise that

Mister Archiater Linnaeus has registered, that animals are lead to eat what does not serve them not solely by hunger, but also by inexperience: the livestock from the Scanian plains, when it comes into wooden areas, gets dysentery from such herbs, which are avoided by those that graze there continually, in the same way as the foreign livestock also eats the Aconitum at Fahlun to its detriment, which the local does not touch. Indeed, young livestock have sharper senses than old; the former therefore can better distinguish the harmful herbs from the beneficial.<sup>116</sup> (259–60)

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<sup>114</sup> „Die Thiere können in ihren Trieben auch zuweilen irren; wiewohl das in ihrer vollen Freyheit überaus selten geschieht.“

<sup>115</sup> „...daß die Biene ein Stück vom Blatte, zur Tapezierung ihrer Zellen, angefangen abzuschneiden, auch zuweilen ziemlich weit damit gekommen war; aber solches nachmals verlassen hat, und zu einem andern Blatte geeilet ist; entweder weil sie sich in der Schicklichkeit des Blattes geirret, oder weil sie die Figur des Einschnittes nicht recht getroffen. Ein Irrthum, den auch ein Mensch leicht begehn könnte, aber der freylich beweist, daß sie nach einer eingeschränkten Vorstellung, und nicht als eine Maschine, handeln.“

<sup>116</sup> An Archiater was a chief physician of a monarch and Reimarus refers here to Carl Linnaeus, who served the King of Sweden in this capacity from 1747. Scania is the southernmost traditional province of Sweden at the tip of the Scandinavian peninsula, and the Swedish city Falun lies northwest of Stockholm. Aconitum is a genus of flowers also known as queen of poisons, aconite, monkshood, wolf's bane, leopard's bane, women's bane, devil's helmet or blue rocket.

„Der Herr Archiater Linnaeus hat bemerket, daß die Thiere nicht allein durch den Hunger verleitet werden zu essen, was ihnen nicht dienet, sondern, daß auch die Unerfahrenheit solches veranlasse: indem das Vieh aus den schonischen Ebenen, wenn es in waldichte Gegenden kömmt, die Ruhr von solchen Kräutern kriegt, welche das dort beständig weidende stehen läßt; so wie auch das fremde Vieh das Aconitum bey Fahlun zu seinem Schaden frißt, welches das einheimische nicht anrühret. Nämlich, das junge Vieh hat schärfere Sinne als das alte; jenes kann also die schädlichen Kräuter von den dienlichen besser unterscheiden. [Nun ist das junge Vieh

In emphasising the different reactions of these different livestock populations to their environment, this example strikingly highlights the limitations of mechanistic models in regard to explaining animal behaviours, as these models imagine the animals' actions to be governed exclusively by physical stimuli and therefore would require both the local and foreign population to turn to the detrimental herb upon the stimulus of hunger. At the same time however, this example presumably proves for Reimarus that animal behaviour is not mediated by experience, and therefore misses flexibility, as otherwise the foreign livestock would learn to differentiate the harmful from the beneficial herbs, while the old livestock would be able to compensate for their deteriorating senses. Whether or not Reimarus' assumption that no individual would learn the harmful effect of the particular herb indeed applies, seems questionable. But apart from this, Reimarus' example undermines completely the preponderance of the universal over the particular and in its wake undoes also the logic of irrelevance and meaninglessness of the particular mediation of empirical animals in the face of the universal tendency of the drive. Indeed, mere subordination of the particular animal under the authority of universal drives and framing it as a simple and essentially meaningless extension and exemplar of an identical, innate blueprint really becomes absurd at this point. Instead, it is the mediation of the particular animal that proves much more relevant for its life and well-being; the universal drives only become meaningful once they are mediated through individual, cognitive, intellectual and thus indeterminate elements and considerations.

These examples highlight that the universal tendency can only be effective through an individual animal's particular mediation in accordance with assessing the

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einheimisch. Daher weis es sich besser zu hüten, als das fremde, welches schon alt ist.]“

circumstances of a specific situation. And indeed, keeping with his examples, Reimarus ultimately reflects such a view himself: “not everything in the drives of animals is meticulously determined, and they often tend to variably and exceedingly determine their actions by themselves, according to the different circumstances,”<sup>117</sup> (262) yet only in such a manner, Reimarus qualifies, as a drive’s essence and the animal’s indistinct power of imagination allows and predetermines. The very obscurity of his qualification to animal self-determination, however, marks his qualifying remark out as a desperate attempt to retract what he cannot allow but nevertheless has to account for. Instead, animals seem neither rigidly and exclusively dependent, nor lacking freedom and self-determination in their behaviour. They even have to negotiate and ultimately determine their actions themselves, in accordance with their own particular perceptions. Indeed, rather than just representing the animal as predetermined and instinctually automated exemplars, both Reimarus’ system and ethology bear testimony to another, mediated animal, which continually reconstitutes itself individually in a tension between the particular and the objective universal and which therefore resists definitive classification.

### **Animal Nonidentity**

Claiming the fixedness of animal behaviour while his account in contrast exemplifies expressly the nonidentity of animal behaviour, Reimarus’ ethology proves ambiguous, suggesting both a certain inattentiveness, or ideological conviction of his writing but simultaneously indeed constituting strength and attraction of his work in respect to

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<sup>117</sup> „Doch ist nicht alles in den Trieben der Thiere bis aufs genaueste determinirt, und sie pflegen ihre Handlungen oft von selbst, nach den verschiedenen Umständen, verschiedentlich und außerordentlich zu determiniren, jedoch so, daß es in dem wesentlichen ihres Triebes, und in ihrer undeutlichen Vorstellungskraft einen allgemeinen Grund der Möglichkeit hat.“

the consideration of animal behaviour. Although Reimarus with his concept of art drives identifies in opposition to Cartesian mechanism psychological rather than exclusively physiological conditions to shape animal behaviour, he notes throughout the *Instinct of Animals* and his discussion of animal behaviour in Chapter Five of *Natural Religion* that animal behaviour nevertheless is perfectly static and fully determined, and he continues to advocate and substantiate this view in the *Drives*. But his account turns against this claim: at all corners of his report on animal behaviour, intentionality and indeterminateness of animals rise to the surface against his asseverations. The size, diversity and vagueness of Reimarus' system of drives itself reflects the ambiguity and elusiveness of his subject matter, in contrast to his claimed homogeneity of animal behaviours. Such contradictions extend deep into his language, which is bustling with anthropomorphisms and references to self-determination, and the repetitive structure of his text, which reflects the constant need to reconfirm the determinacy of animals. Yet the possibly most striking rift in his claim of identity presents his very concept of the art drive and the empirical examples with which he characterises animal art drives, which openly contradict the predetermination of animal behaviour. Rather than showing animal behaviour to be perfectly predetermined, it emerges as imperfect, rogue, occasionally misguided and potentially flawed. Animals appear as spontaneous and hesitating, suggesting they individually assess and adjust to particular situations and circumstances, and thereby point beyond limitations in the conceptual registration of animals. Thus, intending to decisively identify animal behaviour by showing the genius and perfection of spontaneous [*willkürlichem*] animal activities in order to secure its innateness and

prearrangement, Reimarus actually highlights their behaviour's variance and adjusting character.

Reimarus' account of animal art drives thus reflects a tension within the actual, empirical animal as object of knowledge which reveals individual animals as profoundly nonidentical entities. Current ethological research supports this perspective. Bottlenose dolphins are found to memorise the whistles of their companions and recognise other individuals by their particular calls, with memories lasting up to twenty years. Reflecting Reimarus' account of detrimental feeding habits of Scandinavian livestock, bottlenose dolphin calves of up to one year of age "are behaviourally less discriminating than adults or juveniles," (Bruck 2013, 4; King and Janik 2013) possibly suggesting that they are learning to differentiate and assign individual whistles during this time. While Reimarus repeatedly states that bees would "produce bees wax and bring in honey in their proboscis not because of instruction but from innate science,"<sup>118</sup> (Reimarus 1982, *Drives* [1760/2], 163) recent research suggests that the view of insect behaviour, "often regarded as highly stereotyped and under tight control of genetically programmed neural circuits" in fact "does not do justice to the insect order of Hymenoptera (bees, wasps, ants)" (Hammer and Menzel 1995, 1617). Rather, "the odor, color, and shape of flowers are learned when the bee experiences these stimuli" (ibid.).<sup>119</sup> Other examples of individual, deliberate, and somehow reflective and hence indeterminate engaging of animals with the world include the stockpiling of rocks through the night to fire at visitors the next day by a chimpanzee in a Swedish zoo, that suggest future planning abilities, or

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<sup>118</sup> „...machen die Bienen Wachs, und tragen in ihrem Rüssel Honig ein, nicht aus Unterrichte, sondern aus angeborener Wissenschaft.“

<sup>119</sup> On bees' properties of memory and learning see also Zhang et al. (2005; 2006).

the development and teaching of individual hunting techniques in and among different Orca populations (Visser et al. 2008; Osvath 2009).

Rather than to establish any positive claims about animals, both these current examples and Reimarus' account of animal behaviour point towards the inadequacy of explaining animal behaviour in static, universal terms, and the epistemic tension between our concept of objects and the actual objects they refer to, as emphasised by Adorno. For Reimarus this tension proves unproblematic, as he considers the ingeniously reasonable and coordinated constitution of nature by God obvious, something he merely intends to prove and elucidate with his account of animal behaviour. Reimarus' (1982, *Drives* [1760/2], 233) willing and uncritical acceptance of the following obviously fabricated story of an experiment described by Humphrey Ridley (1653–1708)<sup>120</sup> in his book *Anatomy of the Brain* (1695), demonstrates Reimarus' readiness to accede to a notion of the animal that is so devoid of exerting any influence of its own on its actions that it can allegedly manage pretty well without even a brain:

Ridley mentions Caldes' experiment with a tortoise, which, after having its head severed, had lived for another six months, and had wandered about, even when its heart and intestines (only the lung excluded) were torn out, it still had lived for another six hours, and when one lay it backwards on its shell, still knew to throw itself around through swaying, and to help itself on its feet. Such observations and experiments may appear absurd to some: but the skilfulness and caution of the mentioned men leaves no room for doubt; and the most cases are of such constitution, that one can easily take trial oneself.<sup>121</sup> (233)

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<sup>120</sup> The 1725 Latin translation of Ridley's book, which Reimarus cites, refers to the author erroneously as *Henry Ridley*. (Cf. *Dictionary of National Biography*, Vol. 48, p. 284) ([http://en.wikisource.org/wiki/Page%3ADictionary\\_of\\_National\\_Biography\\_volume\\_48.djvu/290](http://en.wikisource.org/wiki/Page%3ADictionary_of_National_Biography_volume_48.djvu/290))

<sup>121</sup> „Ridley erwähnt den Versuch des Caldes mit einer Schildkröte, welche, nach abgehauenen Kopfe, noch sechs Monate gelebt habe, und herum gewandert sey, ja als man ihr Herz und Eingeweide (nur die Lunge ausgenommen) aus dem Leibe gerissen,

Instead of revising his overemphasis on the predetermination of animal behaviour, Reimarus therefore deals with the tension by privileging intellectual perception, or the universal concept, over its object and thereby claiming permanence to their being in the abstract, rather than the particular specimen. Within his prioritising of universal traits and adherence to the essential uniformity of animal behaviour, which occasionally slips into the grotesque, manifests then human thinking's inescapable and unreflected dependence on identification, which Adorno recognises in *Negative Dialectics*, as well as the execution of human dominance over the world through its identification within concepts, for example the rendering of animals as predictable and therefore controllable entities against our contradictory experience of them. But rather than easing the tension between the general concept and particular object, Reimarus indeed accentuates it. Instead of overcoming the contradictions arising in his system and characterisation of drives in respect to the predetermination of the actions of particular animals, his theory of drives – formed at empirical reports – actually oscillates between the particular animal, the general, objective conditions of its material existence, both in respect to its body and environment, and the attempt to completely identify animal behaviour.

As a consequence, Reimarus' ethology precisely highlights the animal as nonidentical within itself, and the limits of universal concepts to fully comprehend the particular objects. Against Reimarus' claim and intentions, his book of drives actually provides a non-deterministic understanding and approximation of animals

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habe sie noch sechs Stunden gelebt, und wenn man sie auf den Rückenschild gelegt, sich noch durch Schwanken wieder herum zu werfen, und auf die Beine zu helfen gewußt. Dergleichen Beobachtungen und Versuche werden manchen sehr widersinnig vorkommen: aber die Geschicklichkeit und Behutsamkeit der angeführten Männer giebt keine Zweifel Platz; und die meisten Fälle sind so beschaffen, daß man selbst leicht die Probe davon nehmen kann.“



and their behaviour, through his attempts to decisively identify animal behaviour. The pictures of animals that his account of their behaviour produces is not one of innate predetermination, but rather one of individual, spontaneous, nonidentical entities, which are constituted and historically mediated by experience, circumstance and stirrings, albeit being bound to certain objective materialistic and possibly psychological (pre-) conditions – poignantly reflected even by his category’s terminology, art drive, with its juxtaposition of artistic autonomy and biological determination. Reading Reimarus’ account against his own intentions, his *Drives* hence proves indeed a remarkably timid, amiable, gentle and careful rapprochement of animals, and his classes appear more like guidelines in Horkheimer and Adorno’s (2002) sense of the concept of classification, in which “general concepts coined by means of abstraction or axiomatically by individual sciences form the material of representation no less than the names of individual objects” (182). However, with his overemphasis on the universal, Reimarus falls in the trap of identificatory thought that Horkheimer and Adorno describe as a general epistemological misconception. While “opposition to general concepts is absurd,” Adorno and Horkheimer emphasise also that

there is more to be said, however, about the status of the general. What many individual things have in common, or what constantly recurs in one individual thing, needs not be more stable, eternal, or deep than the particular. The scale of categories is not the same as that of significance. (Ibid.)

Instead, they stress: “the world is unique” and “classification is a condition of knowledge, not knowledge itself, and knowledge in turn dissolves classification” (ibid.). Reimarus’ approach to classification of animal behaviour, then, appears as such an enlightening preliminary stage for knowledge. Rather than just further developing concepts in the abstract, Reimarus emphasises the breadth and

diversification of the modes of life [*Lebensarten*] by random exemplification, to showcase the myriad configurations to which art drives are adjusted and thus as a precursor to the classificatory system of indistinct behaviours, which turns again into a reflection of the indefinite diversity of behaviour. His classes reconfigure themselves depending on the examples they are filled with. They provide room for encompassing all the uniquely specialised, particular ways of animals to deal and interact with the world around them, in order to reproduce their lives. At no point does his system of classification seem as if it would be narrow and rigid in the Linnaean sense. Instead, the categories he establishes appear soft and porous, flexibly orientated at the myriad and changing appearances of animal behaviour. The system remains open to incorporate variation and leaves room for deviance, singularity and difference within the classes he sets up; the fragments of the “Commenced Observations” testify strikingly to this tension between the conceptual and empirical level.

Although Reimarus, in interpreting animal behaviour as a sign of God’s control, clearly resides with the tradition of animal automation, his reliance on and truthfulness towards empirical accounts of the lifestyles of animals prevents him, due to the immateriality of his subject matter, from succeeding in rigorously suppressing the psychology of animals. Against a modern simplified behaviouristic appropriation of his work, and in fact against his own claims of the meticulous predetermination of animal behaviour, his empirically enriched considerations about animal art drives evince the actual life and psychology of animals, in all its richness. His detailed meta-theory of animal behaviour highlights the limitations of conceptual knowledge and the nonidentity of the object, bringing its individual stirrings into view. Rather than

successfully determining and mapping animal behaviour, Reimarus' work oscillates between concept and object, revealing the dialectical movement of spirit and cognition in which the subject attempts to subordinate the object under the concept in order to gain the upper hand and control. Simultaneously, however, the *Drives* renders such attempts illusionary by making its inner tension between determinate and indeterminate elements visible, relocating the movement within the object. Thus, rather than deciphering it, the object animal comes into view as nonidentical. An ethology that lives up to its object requires to reflect this openness by retracing the tension between universal traits and particularity of the empirical individuals within its objects. With the "Commenced Observations on the Particular Classes of Animal Art Drives" remaining rudimentary and largely unfinished, Reimarus' ethology remains on a general, conceptual level and the *Drives'* empirical knowledge anecdotal. Maria Sibylla Merian's insect studies, sidestepping conceptual issues completely, in contrast fill exactly this empirical nonidentity.

## 5. Merian and the Aesthetics of Insects

In Reimarus' writings, the animal becomes manifest as an entity formed by the tension between objective conditions of its environment and its general commonalities as a member of a species on the one hand, and individual particularities on the other. When Reimarus (1982, *Drives* [1760/2], 290) suggests that "the raised stick frightens the dog, who has been beaten before; the other rejoices, who is used to going out or for a drive, as often as his master reaches for the stick; the third dog prepares to jump, when his master holds up the stick,"<sup>1</sup> this particularity sedimentates in the individual's memory, even without the ability to reason, and shapes its unique future behaviour. Rather than being apathetically identical in their behaviour (which one may conceive as mechanical, instinctually driven or genetically pre-programmed), the individual animal appears as continually interfering and adjusting its behaviour due to the assessment of a situation's circumstance in accordance with past experience, and at times even against alleged instinctual programming. Effectively, this development turns each particular animal into an individual that is nonidentical with any other, but also nonidentical with itself, as it changes over time. Such empirical uniqueness poses severe challenges for any earnest epistemological approach to the examination and representation of animals and nature respectively, and in fact promises significant limitations to their positivist determination as proposed by both Descartes and Reimarus (and also Wilson).

Rather than respecting the object of knowledge as historically and individually

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<sup>1</sup> „Der aufgehobene Stock macht den einen Hund bange, der vorhin damit geschlagen ist; der andere freuet sich dazu, der gewohnt ist mit seinem Herrn auszugehen oder auszufahren, so oft er zum Stock gegriffen; der dritte Hund macht sich zum Springen bereit, wenn ihm sein Herr den Stock vorhält.“

mediated, these thinkers' epistemological projects of systematised knowledge (Descartes particularly in respect to the discourse of methodology and Reimarus in respect to ethology) run aground the paradigmatic hypostatisation of the animal as statically and conclusively identifiable. Instead, the (necessary) flexibility of each individual animal in adjusting its behaviour according to its specific environmental conditions at a given moment in time appears to be an impenetrable frontier for any comprehensively deterministic and conclusive epistemological system, both momentarily as well as historically. The individual qualities of animals prove necessarily and intrinsically interlaced with their being, and the animal as epistemic object hence appears incomplete when epistemologically considered independent of these qualities. The animal arises as a fleeting category that promises to be established only in conjunction with its individual particularity, that is the very elements denied in the Cartesian tradition, both in respect to the animal and nature as object of knowledge, but also within the knowing subject's epistemological approaches.

Rather than surrendering any possibility or justification for general knowledge as a consequence, as Bruno Latour postulates, this raises the challenge of devising a cognitive approach that recognises and incorporates the indistinct, non-determinable element of animals and nature respectively, and thereby approaches the animal in its interconnection with subjectivity, instead of detaching subjectivity both from the object but also the process of cognition. The latter is represented by Descartes, who ascribes the recognition of individuality and self-determination within animals to an empathic, emotional (and misleading) mode of cognition, which would falsely recognise animals as individualised entities with feelings and stirrings of their own

based on outward similarities between human and animal behaviour. Against such misguided cognition, he posits a methodical proceeding based on the identifying and determining rationality of mathematics, which represses this empathic mode of cognition through a strict web of epistemological procedures and subordinates any aesthetically appreciative or mimetically empathic response by humans to a standardised rationality (Adorno 1984). But while Descartes claims that people would simply and falsely project their own selves onto the objects of knowledge, Reimarus' *Drives*, against the latter's claims, authenticates animals as mediated exactly by the individuality Descartes deprives them of. Rather than a mere projection of human self onto the objects of knowledge, it seems that such empathising cognitive comportment indeed successfully nestles up to its objects of knowledge and reveals some truths about their being. Since in general art stands for a subjectively mediated and aesthetically appreciative approach to perceiving the world and, according to Adorno, provides a retreat for mimetically empathic comportment and provides priority to the object in the cognitive process (Hullot-Kentor 1997, xiii–xiv), this final section of my study turns to Maria Sibylla Merian's entomological work. Transgressing the boundaries of art and science in her involvement with the study of butterfly metamorphosis, her work provides a model for honouring the nonidentity of animals and concretises what has been described by Adorno as aesthetic comportment in knowledge.

Merian's works have indeed long intrigued and challenged scientists and scholars alike. Beautifully arranged and luxuriously coloured with incredible precision and artistic skill moths hover over willows in her depictions, butterflies rest on lime twigs, caterpillars crawl underneath buttercups and munch on cherry leaves,

while pupae hang suspended from fruits of castor-oil trees. Her work's exuberance continues to fuel arguments about whether Merian's depictions belong to the realm of science, and thus provide objective information, or whether they belong to the domain of art, and are hence to be considered, in relation to our knowledge of nature, merely as contemplative decoration. While the history of the reception of Merian's work, as the rest of this chapter will show, is rich of verdicts, scholarly opinions are also just as conflicted and diverse as her life and work are multifaceted and unconventional: Her work has been described as inept, naïve and antiquated, but she has also been praised for the allegedly exactness of her portrayals informed by scholarly, ecological foresight. Her illustrations have at times been condemned as ripe with errors that led other scientists astray, and at other times rehabilitated as overlooked contributions to the success story of modern science. Alleged errors in her depictions have been disproven and the scientific rigour of her work assured, but it nevertheless has been generally relegated to the realm of decorative arts. Some have disqualified her science but applauded her artistry, while others cherished her art in conjunction with her science. Notably, dismissal and appraisal cannot be clearly allocated to any one discipline. Negotiations of her oeuvre rather carry with them an awkward, almost unreal simultaneity of panegyric and vituperative elements. Indeed, her work often seems to simultaneously alienate and enthrall the same scholar.

Merian's books themselves only seem to contribute to such contradictions.<sup>2</sup>

Instead of leaning one way or the other, artistry gradually blends with the

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<sup>2</sup> Aside from the books, there are individual pieces scattered amongst collections across the globe. The most prominent and substantial holdings are located at the Academy of Science in St. Petersburg, parts of which are reproduced in two facsimile editions and various exhibition catalogues, as well as the British Museum in London and the Royal Collection at Windsor Castle, both of which have been produced in

investigation of the metamorphosis of moths and butterflies. Between 1675 and 1680, she published three sets of twelve engravings of plants, compiled 1680 as *New Book of Flowers* (Merian 1981; hereinafter referred to as *Flower-book*). These collections mainly served as pattern books for embroidery and practicing drawing, and although they contain some insects, the creatures serve exclusively decorative purposes (Ludwig 1996, 193; Figures 6 and 7, see Appendix). In 1679 and 1683 respectively, she adds to these collections her books *The Caterpillars' Marvellous Transformation and Strange Floral Food, First Part* and *Other Part*, both printed in octavo (hereinafter referred to as *Caterpillar-book 1* and *2*).<sup>3</sup> Presenting different local butterflies and moths grouped together with their food plants, the books' character noticeably differs from her *Flower-book* with its decorative flower paintings (Figures 11–13, 15, 20 and 21, see Appendix). Additionally, the illustrations in the *Caterpillar-books* are accompanied by written accounts of Merian's research, including where and when she found the specimens, the different stages of their

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special, high quality facsimile editions but can also be accessed online. While these three collections are well documented, one problem that derives from other, more remote and isolated individual pieces is that their attribution is often unverified. (Ludwig 1998; Reitsma 2008; Valiant 1993) More problematic in the context of my examination, however, is that it is difficult to establish the purpose and objectives of these individual pieces in respect to the representation of nature and therefore to assess their stylistic properties from the perspective of knowledge production about nature. Were they supposed to be informative illustrations of nature? Or are they works meant for decoration? Are they commissioned works, and carry their representational schemes the demands of the client? And finally, are they finished, or mere preliminary studies? With Merian's publication, these questions are much easier to determine. They are obviously finished pieces, as they were published, and their function is clearly laid out in the prefaces of the books. For these reasons and since I am interested in the general form of Merian's representation and study of nature rather than idiosyncrasies and peculiarities *within* her oeuvre, my analysis will concentrate on Merian's publications and research journal, while largely ignoring individual pieces.

<sup>3</sup> From Merian's estate her daughter Dorothea (1678–1743) posthumously published in 1717 a third volume in a Latin collection with the first two volumes under the title *Erucarum Ortus, Alimentum et Paradoxa Metamorphosis*.



metamorphoses, their behaviour and detailed explanations of their physiology, providing a comprehensive perspective of her subject-matter. Her occupation with the natural history of Lepidoptera culminated in the publication of her book *Metamorphosis Insectorum Surinamensium* in 1705 (hereinafter referred to as *Suriname-book*), in which she presented material from a research trip to Suriname. Albeit following in principle the same structure as the *Caterpillar-books*, the *Suriname-book*'s artistry even exceeds the former (Figures 2 to 5, 14, 16–18 and 22–24, see Appendix). Due to Merian's perfected artistic skills, the more lavish, sophisticated and beautiful plates of the *Suriname-book* receive an even grander appearance from the more luxurious folio format it was produced in, while the texts also prove much daintier. Additionally, a research journal of Merian exists that contains study notes from presumably 1660 to 1713 (hereinafter referred to as *Study-book*; Figures 8 and 10, see Appendix; for the *Study-book*'s dating see Beer 2011a, 59–60).

Suspended between observational and decorative rationales in their representation of nature, and produced against the backdrop of the emerging differentiation and separation of knowledge into scholarly disciplines, Merian's works prove notoriously difficult to characterise. In fact, her oeuvre seems to evade any attempt to assign her a place in the world of disciplinary differentiation: when its decorative side is accentuated, cognitive elements keep coming into view, but if the focus is instead upon her scholarly perspective, her artistry takes over again. On the one hand this ambiguity has produced attempts to rehabilitate Merian as an equal and important contributor to the rise of the Modern sciences. However, considering her integrative approach to illustration which provides all states of one genus'

development, their food plants and at times even additional information on their cultivation, her work is on the other hand perceived as an apparent forerunner of current ecological perspectives. (Cf. Davis 1995, 151; Etheridge 2011; Guentherodt 1989; Schiebinger 1998; in moderation also Hochstrasser 2010) Such twofold assessment of Merian's contribution, which simultaneously tries to recover its scientific merit and to present it as a challenge to the Modern scientific mainstream, remains highly contradictory, and only insufficiently reproduces the ambiguity of Merian's work, which appears both scientific and unscientific at the same time. Rather than recovering and re-evaluating Merian's work, such perspectives proceed uncritically and unhistorically, (Schmidt-Linsenhoff 1998; Wettengl 1998a, 22–3) and merely utilise it to lend substance and value to current ecological claims. In fact, Merian was neither specifically interested in preserving natural resources nor concerned about their over-exploitation: on the contrary, especially in her *Suriname-book* she regularly comments on wasted opportunities for utilising the depicted plants and calls for their intensified cultivation. The American cherry, for example, "probably could be cultivated better ... , if the land would be inhabited by a harder-working and less self-serving people" and the non-native fig "would be more plentiful in Suriname, if only the people would grow them," while voicing regret that no one in Suriname is interested in cultivating vanilla or "searching for other staples," many of which undoubtedly "could be found in the forest, if it were passable"<sup>4</sup> (Merian 1998,

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<sup>4</sup> „Wahrscheinlich ließe sich diese Frucht vollendeter kultivieren, wenn das Land von einem arbeitssameren und weniger eigennützigem Volk bewohnt würde.“

„Es ist schade, daß es keine interessierten Menschen in diesem Lande gibt, die so etwas kultivieren und noch nach anderem suchen, was ohne Zweifel in dem großen und fruchtbaren Land zu finden ist.“

„Sie wären reichlicher in Surinam, wenn die Leute sie nur anbauen wollten.“

*Suriname-book* [1705], 22, 58, 74, 80). These passages have been read as critique of the colonialists in Suriname and the colonial project, (Davis 1995; Schiebinger 1989; Todd 2007) but they also may well be directed at the indigenous population and express at least Merian's pronounced encouragement of Suriname's economical and natural exploitation (Schmidt-Linsenhoff 1998, 210). The tendency of selectively constructing Merian as an idealised object of identification that would defy historical circumstance, as Viktoria Schmidt-Linsenhoff (ibid.) criticises in feminist discourses, seems to be apparent also in the attempts to stylise Merian as ecologically conscious vanguard. However, exploiting rather than valorising Merian's work in such a way reduces it to an illustration in contemporary scientific and political controversies and restricts it to current ecological discourses instead of revealing the potential of her work which may point beyond our current situation.

In opposition to such critiques, Kurt Wettengl (1998b, 8) introduces Merian's work in a catalogue "from the perspective of contemporary science criticism and in view of the progressive destruction of our natural environment." Within these debates, "signs of a fundamental change in theoretical approaches to science have become increasingly apparent over the last twenty-five years," including "a critical appraisal of the traditionally predominant distinction between scientific knowledge and other forms of knowledge" (ibid.). In particular, Wettengl refers to "the phenomenology of nature on the one hand, and aesthetics on the other," (ibid.) the latter of which he views as the critique of scientific practices and paradigms through the production of artworks, for example Marcel Duchamp's playful physics. In stark contrast to Adorno, such aesthetic criticism seems in Wettengl's perspective almost

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„... meiner Meinung nach könnte man viel mehr Dinge in dem Wald finden, wenn dieser passierbar wäre.“

limited to a commentary function which amounts to little more than pointing out the absurdity of scientific rigidity. Consequently, and because she would forego the insects' classification while paying respect to "ecological communities," he calls "to illuminate Merian's approach as a phenomenological alternative to modern science" (Ibid.).

Focussing on the content of Merian's plates, all of these approaches try to recover their epistemological content detached from their aesthetic qualities, that is, on the one hand, the artistic construction and specific composition, or aesthetic form of Merian's depictions; and on the other the sensory elements of her descriptions, both pictorial and textual. In contrast to such positions, Schmidt-Linsenhoff (1998, 208, translation modified) suggests however that it is precisely the "striking difference in the aesthetic representation" of Merian's work that promises an alternative to Modern science. Through the lens of seventeenth century Dutch pictorial arts, David Freedberg (1991, 418) samples Merian's *Suriname-book* as "pinnacle of entomological illustration," and raises the question of the relationship between representational forms and knowledge and the cognitive meaning of artistic representations of nature. Comparing drawings of a bird of paradise made by the botanist Johann Faber (1574–1629) and Rembrandt, (Figure 1, see Appendix) he concludes that in

each case the animal is presented in all its parts, ready for study, analysis, description, and classification. Yet Rembrandt's own drawing, taken from a dead specimen kept in a drawer in his *kunstkamer*, makes it look as if it were sufficiently lively to fly off the page – something the other beast could never do, despite the presence of all the parts that enable flight. It is analytic (roughly), it is descriptive – but it is to Rembrandt that we turn, again and again, for the essence of the animal. (Ibid.)

Freedberg thus turns the spotlight on the artistic study as an alternative and possibly more apt means to represent and understand the animal, a domain today exclusively entrusted to the quantitative sciences. Johann Wolfgang von Goethe (1962, 103) more specifically describes this potential as the ability of fine arts to capture “the particularity” or “suspendedness” of natural objects, which exceeds general concepts. In his call for the further development of the inclusion of such particularity in the representation of nature, he mentions Merian’s work, among other Dutch flower painters of the seventeenth and eighteenth century, as especially prolific attempts for realising this potential. Schmidt-Linsenhoff (1998, 218–9) finally concretises with reference to the aesthetic qualities of the plates and texts of the *Suriname-book* that Merian explicitly mediates her perspective as researcher as partial and limited. Thereby, her descriptions of nature would construct a subjectivity and reproduce an attitude towards nature which connect the viewer with the research objects and encourage him or her to marvel at the insects rather than perceive them as objects of domination. As a consequence, Merian’s representations would point “to the difference between the image of the butterfly and the butterfly itself” and thereby provide a reference “to the limitations of an anthropogenous, technically articulated aesthetics of nature,” qualities which would mark Merian’s perspective as behaving responsibly towards her objects of knowledge and transcending an anthropocentric perspective (ibid., 219).

Within the line of inquiry these last scholars have pointed out but not explored fully, Merian’s work and mediation of her research objects seems to promise a way out of our epistemological and ecological dilemma in our relationship to nature that lies beyond simple acknowledgement of ecological relationships. The confluence of

artistic and scholarly rigour designates Merian's work as subjectively mediated and hence antithetical to the efforts of Descartes and his struggle to base cognitive reliability on strict methodological, mathematical proceeding, as opposed to an empathic approximation to the objects of knowledge. Descartes' attempt, however, proved undermined in particular by the nonidentical lives of animals. In contrast, Merian's oeuvre promises an approach to the study of nature that proves capable of recognising and reflecting the nonidentity of animals, and as such an epistemological approach that points beyond reason's compulsion to identify and that may be able to negotiate our current confusion about the quality of nature as object of knowledge. Moreover, Merian's work expresses a specific subjectivity while her artistic mediation of the experience of the research objects exerts a cognitive effect on the perceiving subject that encourages the recognition of the other as nonidentical. As a consequence, her general approach to the objects of her research as well as the form Merian deploys in representing them take centre stage in the following, rather than her motivations or the scientific correctness of her work. Furthermore, I place special emphasis on the implications Merian's artistic-epistemological approach carries for the integrity of object and subject in the cognitive process.

Epistemological, cognitive and methodological qualities of Merian's work have been taken up only indirectly so far. While Tomomi Kinukawa (2001), Janice Neri (2011) and Ella Reitsma (2008) address representational aspects of Merian's work, the first two use their examinations to the benefit of elucidating cultural historical contexts, while the third focuses particularly on painting techniques and endeavours to distinguish the different hands of Merian and her daughters. Epistemological and cognitive questions are largely absent from these works. Although Julie Hochstrasser

(2010) does consider the cognitive role and importance of experience for the production of knowledge in Merian's *Suriname-book*, she discusses Merian's work as an example of such knowledge, concentrating mainly on tracing the networks that were connected with the knowledge process, without considering in detail how this perceptual knowledge enters her depictions. Finally, Katharina Schmidt-Loske (2007) examines the accuracy in the depiction of specimens in a random selection of Merian's paintings, without however discussing the cognitive impact of Merian's particular regime of representation for the objects' portrayal.

Invoking Merian positively as example for the study of nature, it may appear that I am breaking with Adorno's imperative of epistemic negativity, but my claim is actually that Merian's work is an epistemic approach to nature that itself remains negative and thereby negates the dialectical movement of reason in which the domination of nature increasingly came to win the day. Indeed, Merian's work seems to represent a form of knowledge that transcends reason's compulsion towards identity, dissolving classification into knowledge even though relying on identification while remaining open and nonidentical nonetheless (cf. Horkheimer and Adorno 2002, 182). As such, Merian represents an example of what Adorno describes as aesthetic comportment in cognition, while my recovery of Merian's procedures provides an attempt to concretise this concept within the execution of such comportment, and also a way to reflect the nonidentity of animals through their identification. The present chapter therefore is as much an attempt to evaluate the ability of artistry, or aesthetics to reflect the nonidenticalness in particular respect to animals and respectively also nature, as it seeks to substantiate Adorno's suggestions about aesthetics as specifically negative dialectical mode of cognition that liberates

the object from identifying thought by granting it priority in the cognitive process. At the same time, Merian's plates promise to confront the subject of knowledge with the nonidentity of the object of knowledge and the limits of thought to identify the object, potentially providing an experience of nature through the animal that breaks through the instrumentalisation of reason for the domination of nature and offers the possibility of reconciliation instead.

The latter element is explored in the study's first part. By means of an immanent critique of the reception of Merian's oeuvre, developed through reconstructing the changes in the assessment of her work, a contradictory superimposition of positive and negative references to Merian's work manifests. This ambiguous valuation of Merian's approach to natural history has its roots in Merian's aestheticised form of cognition. Being simultaneously dismissed and having its epistemic value stressed, it qualifies as determinate negation of the knowledge paradigm of the sciences that promises to overcome the limitations of scientific knowledge of animals and nature. Following this discernment, in the chapter's second part Merian's epistemological approach is reconstructed in its historical context and under particular consideration of its effect on the mediation of subject and object in the cognitive process. Through this, it is possible to recover aesthetics as superordinate examination regime to the scientific examination that allows for capturing the element of nonidenticalness in our understanding of animals.

### **Entomological Unrest**

Merian's depictions of the natural world were held in high esteem in her own time. Already in 1675, at the beginning of her career and well before the *Suriname-book's* publication, the distinguished German art-historian and painter Joachim von Sandrart



(1606–1688) praises Merian’s “masterly accomplishment in the depiction of flowers, fruits and poultry as well as the excrements of worms, flies, mosquitos, spiders and suchlike ... in drawing as well as in coloured paints and etching” and that she deserves “fame for her utmost perfection of this art”<sup>5</sup> (Sandrart 1675, 339). The reprinting of her first two *Caterpillar-books* (in 1713 and 1714), along with the production of a third volume during her lifetime reflect a widespread and sustained demand for her work. The *Suriname-book* was published simultaneously in a Latin and a Dutch version, making it accessible to the Dutch bourgeois public as well as an international scholarly audience. There were plans for a German version, and further interest from British naturalist James Petiver (1663–1718) for an English edition, although both failed to materialise (to Volckamer from 16 April 1705, in Merian 1998, *Letters* [1682–1712], 267, original translation; Kinukawa 2001, 267–70).

Contributions of botanical classifications to her *Suriname-book* by the botanist Caspar Commelijn (1668–1731) further demonstrate both her reputation and the degree of scientific seriousness with which her work was received by her contemporaries.

This acclaim was sustained throughout the eighteenth century, as suggested by the numerous reprints and translations of her works.<sup>6</sup> Additionally, her place was secured early in the collective memory of natural history thanks to Carl Linnaeus

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<sup>5</sup> „... die verlangte gute Information in der Zeichen-Kunst und Mahlen mit Oel und Waßerfarben auf allerley Zierath in Blumen/ Früchten und Geflügel/ besonders auch in den Excrementen der Würmlein/ Fliegen/ Mucken/ Spinnen und dergleichen Natur der Thieren auszubilden/ mit samt dern Veränderungen/ wie selbige Anfangs seyn/ und hernacher zu lebendigen Thieren werden/ samt dern Kräutern/ wovon sie ihre Nahrung haben/ mit großen Fleiß/ Zier und Geist/ so wol in der Zeichnung/ als in den colorirten Farben/ und Rundirungen meisterhaft zuwegen gebracht ... daß sie dannenhero in dieser ruhmwürdigen Kunst/ der natürliche Blumen/ Kräutern und Thieren/ allervollkommenst zu seyn das Lob hat.“

<sup>6</sup> For overviews of editions of Merian's works see Reitsma (2008, 34) and Schmidt-Loske (2007, 128–30; 2009, 190).

(1707–1778), who relied substantially on Merian’s work to devise his classification system and named several species after her (Schmidt-Loske 2007, 40–2; Stearn 1978, 18–21). By the end of the eighteenth century, Sebastian Hüsgen (1745–1807) observes that her reputation had grown to the extent that “both naturalists and painters, generally and well deservedly applaud her meticulous examination of all” in her books “introduced species of insects, frogs, toads, snakes etc., as well as their transformations”<sup>7</sup> (Hüsgen 1790, 268–9). Worthy of particular merit, according to him, is that in Merian’s books “one can see the origin and transformation of all kinds of species of butterflies and insects from their caterpillar or worm, together with their food plant, -fruit or -flower, especially perfectly, beautifully depicted”<sup>8</sup> (ibid., 269). Merian’s studies were widely accepted as providing valuable knowledge about insects and they were celebrated not in spite of, but especially because of their artistic vigour and exuberance. (Cf. also Doppelmayr 1730; Houbraken [1719] 1880, 377–9; Römer 1782)

In the nineteenth century, however, the high regard for Merian’s work declined and became the target of sharp criticism. Reverend Lansdown Guilding (1797–1831) of St. Vincent, for example, found that the *Suriname-book* “abounds with errors” and that it proves “sadly deficient in that minuteness of detail which is indispensable” (Guilding 1834, 356). This verdict appears especially remarkable considering how directly it contrasts with the particular appreciation, just some forty years earlier, of

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<sup>7</sup> „Sowohl Naturforscher als Mahler geben ihr den allgemeinen und wohlverdienten Beyfall, daß sie alle vorgestellte Arten von Insekten, Frösche, Kröten, Schlangen u, wie auch ihre Verwandlungen auf das genaueste untersucht, und nebst ihrer Nahrung mit den lebhaftesten und frischesten Farben abgebildet habe.“

<sup>8</sup> „Es hat auch vor andern Werken ausländischer Insekten den Vorzug, daß man darinn die Entstehung jeder Arten Schmetterlingen und Insekten, aus ihrer Raupe oder Wurm, nebst ihrer Nahrungs=Pflanze, Frucht oder Blume vollkommen, schön abgebildet sehen kan.“

Merian's meticulousness in the depiction of her research objects. Two different kinds of problems, however, have to be distinguished in Guilding's critique: wrong assignments, both of the different developmental stages of a species as well as insect species to food plants, and wrong depictions of specimens. Consulting her original works under the conditions of the seventeenth century, Gerrit Friese (2011, 417) judges that in regard to the latter point the rate of possible identifications is in fact "extraordinarily high" and "the best proof of the comparative accuracy of her work, which far surpasses that of her predecessors, and that of many who came later." For almost all of the 555 species represented in Merian's *Study-book* the phylogenetic order can be established at least, and in 519 cases the family can be determined, whereas 300 depictions are even traceable to the species. Accusing Merian of inattentiveness to detail therefore seems absurd; on the contrary, an exceptional eye for detail was probably the most salient quality of her work. Moreover, most imprecisions can be blamed on poorly developed technical capabilities to study specimens, since "the accuracy of the illustration, and thus the accuracy of identification, decreases as the natural size of the creature depicted decreases" (ibid., 416). The question of correct allocation of specimens to one another, however, is somewhat equivocal. While the *Suriname-book* contains several mistakes in this regard, the *Caterpillar-books* are strikingly accurate, and inaccuracies in the former thus can be ascribed to some extent to the working conditions in Suriname, rather than a general observational negligence. After her death, Merian's reputation was additionally compromised by a particularly defective but widespread French reprint of her oeuvre from 1730 that most nineteenth century scholars seem to have worked with (Valiant 1993, 475–6). Yet Hüsgen (1790, 267) already complains about the

poor quality of the coloration and prints of this particular edition and accordingly, the problem could have been known to Guilding. Besides, a significant amount of Merian's observations that were dismissed as fables have later been found to be correct (Reitsma 2008, 35; Schmidt-Loske, 2007).

Indeed, Guilding's critique actually aims in another direction, wherein it reflects the shift in early Modernity from the enchantment by nature which becomes so obvious in the reception of Merian's work in the eighteenth century, towards the production of apparently useful, objective knowledge. The *Suriname-book's* "grand defect," he continues his attack, "is the introduction of idle stories, related to [Merian] by strangers" that would "go far to destroy that confidence which would naturally be given to a patient observer of nature" (Guilding 1834, 356). Additionally, "much fault is to be found with the absurd position of many of the figures," to say nothing of the inclusion of "one of those fanciful and useless frontispieces which were formerly thought indispensable in an illustrated work, and which occupied, to no purpose, the time and labour of the engraver" (ibid.). Mismatches of species, developmental stages and food plants in Merian's plates that allegedly have resulted from such flawed proceedings would have led other writers like Linnaeus "to give very inapplicable names to various species of *Lepidóptera*" (ibid.). Such criticism, of course, attests to the growing power of the epistemological ideal of the exact, quantitative, systematising sciences during that intervening half-century. Anecdotes are rejected, as are the aesthetic features that Hüsken perceived as particularly appealing and valuable some forty years earlier. The accusation that certain faults in Linnaeus' taxonomical system originated with Merian functions in a particularly intricate way to exonerate the Modern epistemological paradigm of responsibility for such

mistakes and faults. Moreover, displacing errors from a male scientist to a female artist of natural history also privileges the former over the latter and highlights the gendering of knowledge that associates male perspectives with objectivism and female perspectives with subjectivism (cf. Keller 1983; Kappeler 1986; Keller and Grontkowski 1996). Such male imposition of restrictions on what may legitimately count as knowledge clearly resonates within Guilding's criticism. In the name of alleged objectivity, female and indigenous observers are disqualified as bearers of knowledge, alongside the arts as a source for knowledge about nature.

Although Guilding's judgement seems to mirror a general eschewal of Merian's work in his time and is usually enlisted as proof for the disappearance of Merian from entomological discourse in the nineteenth century, the way Merian actually figures in entomological literature challenges such an absolute reach of the epistemological paradigm of the exact sciences. While Merian's oeuvre in the nineteenth century certainly did not enjoy the same widespread public prominence and admiration as previously, there are several entomological works, in English as well as in German and French, that discuss her research (cf. Burmeister 1855; Duncan 1835–52; Freyer 1842; Kirby and Spence 1815–26; Kraatz 1870; Percheron 1835). Additionally, she is mentioned in various encyclopaedic volumes (for example Cuvier et al. 1840; Engelmann 1846; Hagen 1862; Partington 1837; Swainson 1840; Westwood 1839). More importantly, these references were not only negative. There were some that shared Guilding's reservations about her work. Entomologist William Macleay (1792–1865), for example, goes even further than his colleague when he not only declares Merian “guilty of inaccuracy,” which “might have been pardoned,” but imputes to her “wilful inventions” that

are inexcusable. She it was, I believe, who first agitated the nerves of our unscientific great-grandmothers with the choice fable of bird-catching Spiders. The history of this fiction, although perhaps rather infringing on the unity of my Paper, is somewhat curious, as it will show how what may have originally been nothing more than a vague filmy misconception, can become gradually embodied into a pictorial lie. (Macleay 1834, 190)

Macleay's judgement of plate 18 from Merian's *Suriname-book*, in which a bird-eating spider is depicted devouring a hummingbird, (Figure 2, see Appendix) equals Guilding's gendered contrasting of objective knowledge with allegedly female irrationality and emotionality, and even surpasses the latter's devaluation by accusing Merian of deceit. Amplified even further by referring to the age of his great-grandmothers, Macleay additionally blends his devaluation with the progressivist persuasion of the superiority of nineteenth century science over any pre- or non-scientific forms of knowledge of nature, especially the arts. However, while there was a noteworthy debate in entomological circles during the early nineteenth century about the supposed consumption of birds by spiders, (Smith 2000, 2001) Macleay's position was anything but the most authoritative or widespread one, as the following excerpt shows:

It is to Madame Merian that we owe the origin of the story that the large American Mygale attacks and kills small birds; this lady in her splendid work on the insects of Surinam, not only asserting this, but figuring the Spider in the act of feeding on a Humming-bird which it had dragged off its nest. Hence originated the idea that the Mygale spun the webs which are met with in tropical climates, of sufficient force to hold small birds, but which are the production of a species of Epeira. Mr. MacLeay, in the first volume of the *Transactions of the Zoological Society*, has attacked this lady with great violence, giving her credit for all that subsequent compilers chose to add to her account. She, however, did not assert that the Mygale forms these webs, nor is such the case, for that spider lives in holes under ground, and in all its movements keeps close to the earth, its food consisting of Juli, subterranean Crickets, and Cockroaches. On a living Humming-bird being placed into its hole by Mr. MacLeay, the Spider even quitted it; whence he disbelieves the existence of any bird-catching Spider; but M. Moreau de Jonnès expressly mentions that it climbs the branches of trees to devour the young of Humming-birds, &c. (Cuvier et al. 1840, 457; see also Partington 1837, 303)

Rather than reflecting the aggressive tone of Macleay's attack, this discussion of Merian's portrayal is much more balanced and careful in its consideration of her studies and tries to mediate between her observations and those of others, giving a much more nuanced assessment of the plate in question. And indeed, asserting that these spiders "do not spin long threads, as some travellers tried to make us believe," and adding that "for lack of ants they catch the small birds from their nests,"<sup>9</sup> Merian (1998, *Suriname-book* [1705], 44) is much more critical (and accurate) in her description than Macleay suggests. As subsequent studies have shown, even though spiders of the family *Mygale* do not usually hunt birds and the name bird-eating (or bird-catching) spider is therefore something of a misnomer, they do nonetheless at times prey on weak birds or nestlings, and a scene as depicted might very reasonably have been observed by Merian (Schmidt-Loske 2007, 83–5). While Macleay (1842) retracts a claim he made earlier that generally no spider would prey on birds after he encounters an individual of the species *Epeira Diadema* devouring a bird in Australia, he nonetheless explicitly reconfirms his claim regarding *Mygale*. What is noteworthy about Macleay's criticism, then, is the sustained and outright rejection of the mere possibility that Merian might have observed the specific scenario involving an individual of the genus *Mygale*, an obstinacy which, it seems, even stupefied his contemporaries (see especially Shuckard 1842; also Bates 1855; Tennent 1861, 467). His refusal to even acknowledge other observations highlights his ideological involvement with Merian's work that appears essentially not concerned with questions of scientific accuracy, but driven by the same methodological and formal discontent with Merian's work as Guilding displayed.

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<sup>9</sup> „Sie spinnen keine langen Fäden, wie uns einige Reisende glauben machen wollten. ... Sie holen in Ermangelung von Ameisen auch die kleinen Vögel aus den Nestern ...“

The debate concerning the catching or eating of birds by spiders reveals a much greater diversity of perspectives in the reception of Merian's work than commonly assumed. Indeed, recognition of Merian's accomplishments even lasted throughout the nineteenth century, as the inscription of her name among those of other important biologists into the façade of a new library wing of the Zoological Museum in Amsterdam in 1872 suggests (cf. Reitsma 2008, 35n26). It is also in the nineteenth century that the first systematic studies of the entomological content of Merian's works appear, illustrating how she remained a person of significance in the field of entomology and that her work was still perceived as part of the growing discipline of natural history (Burmeister 1855; Freyer 1842; Werneburg 1864). The recognition she received, however, proves remarkably contradictory. On the one hand, naturalist James Duncan (1804–1861) honours Merian with a memoir in his seven-volume overview of entomological sciences in the illustrious company of such scholars as Jan Swammerdam, Jean-Baptiste Lamarck (1744–1829) and John Ray (1627–1705).<sup>10</sup> The reason for this acclaim, on the other, is not that Merian “can lay claim to high distinction as a scientific naturalist, nor can it be affirmed that either her powers of observation or the capacity of her judgement were of the first order,” but rather “the extraordinary zeal, ... sacrifices and inconveniences” she demonstrated in her activities, “the excellent delineation which she has made of many natural objects, and the mass of materials which she has thus provided to facilitate the labours of future inquirers” (Duncan 1836, 17–8). Merian receives accolade for her character as an industrious woman, not her entomological observations, while her depictions only become scientifically valuable, because they allow later (presumably male) scientists

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<sup>10</sup> The other memoirs appear in volumes I, (1840) V, (1837) and VI (1852).



to make their marks. An obvious gender issue is at play here that denies a woman any acknowledgement for her achievements, except those perceived as womanly; any real or proper contribution by a woman to such a manly endeavour as science seems inconceivable. But Duncan's claim reveals an ideological hypocrisy: rejecting Merian's representations of insects as not worthy of acknowledgement, he simultaneously praises precisely the excellence of these representations for the sciences. What Duncan means, of course, is that Merian has exceptional artistic talent, an adequate field of activity for a woman, but that this does not qualify as scientific aptitude and rather stands in the way of any such rigour. Instead, her depictions have to be raised to a scientific level by putting them first in an acceptable form. This, however, makes it all the more surprising why Merian should be honoured alongside actual scientists then. Indeed, the consideration of Merian's work in Duncan's entomological encyclopaedia implies an acknowledgement of a scientific relevance, which Modern entomology however simultaneously refuses to acknowledge, and tries to suppress by declaring it non-scientific, because it does not meet the standards of the Modern scientific paradigm and comes from a woman. Both her gender and the form of her depictions are being held against Merian's work, in a way that serves to deny it the authority, as a form of knowledge, of that associated with properly Modern, and by assumption masculine, scientific endeavours.

Rather than that Merian's work would simply disappear over the course of the nineteenth century, scholars hence display involuntary yet complacent duplicity in dealing with it. William Kirby (1759–1850) and William Spence (1783–1860), for example, seem to move effortlessly back and forth between unquestionably trustful

and condescendingly distrustful consideration of Merian. Faithfully relying on her depiction, they write that

caterpillars are rendered striking by the brilliant colour of the tubercles from which their hairs emerge. A remarkable instance of this is the thick large caterpillar of a Bombyx, which feeds upon the *Psidium pyferum*, or white Guava, figured by Merian. (Kirby and Spence 1815–26, 3:178; Figure 3, see Appendix)

Just a few lines later and now talking about a different caterpillar, they however note that she “mistakes it, with her *usual* inaccuracy,” (ibid., emphasis added) thus creating a revealing tension between the demand for the very specific and reductionist accuracy of the exact scientific paradigm and the representational vigour and knowledge of artists to capture the world, which was so widely cherished in Merian’s work by eighteenth century writers. One page further, now talking about spurs, the authors return to Merian as a trustworthy reference, as if their former remark was not existent. Some butterflies, they explain,

are clothed with long sharp points, which claim the denomination of spines, rather than that of hairs or bristles; being horny and hard, and so stiff at the point as readily to pierce the skin. Those of the last mentioned species, Madam Merian says, are as stiff as iron-wire. (Ibid., 3:179; Figure 4, see Appendix)

At the same time, of course, referring to Merian as “Madam” courteously but assertively denies her the rank of a fellow scientist. Such a double standard is finally pushed to breaking point in the following example, which comments on the already mentioned *Suriname-book*’s plate 18 (Figure 2, see Appendix):

Madam Merian, in her *Surinam Insects*, speaking of the large-headed ant (*Formica megacephala*, L.), affirms that, if they wish to emigrate, they will construct a living bridge in this manner: – One individual first fixes itself to a piece of wood by means of its jaws, and remains stationary; with this a second connects itself; a third takes hold of the second, and a fourth of the third, and so on, till a long connected line is formed fastened at one extremity, which floats exposed to the wind, till the other end is blown over so as to fix itself to the opposite side of the stream, when the rest of the colony pass over upon it, as a bridge. This is the process, as far as I can collect it from her imperfect account: – as she is not always very correct in her statements, I regard this

altogether fabulous, till I met with the following history of a similar proceeding in De Azara,<sup>11</sup> which induces me to give more credit to it. (Kirby and Spence 1815–26, 2:101–2)

While the authors appear to critically and seriously discuss Merian's account on the surface, they indeed introduce her story as a sort of feminine fancy until finding it confirmed by a 'proper', male scientist – who, typically enough, does not need an honorific – and even then doubts seem to prevail towards Merian's account of the behaviour, in contrast to De Azara's.

While entomologists thus engage with Merian's research on a professional level, mentioning, referencing, deploying and criticising her observations, they simultaneously condescendingly dismiss them for apparent inaccuracy. Merian's depictions evidently were considered in some respect accurate and reliable, yet above all scholars nevertheless distrusted them. Thus Kirby and Spence (1815–26, 3:178), for example, cite from the description to plate 19 of Merian's *Suriname-book* Antonie van Leeuwenhoek's (1632–1723) assumption that protrusions scattered along the body of the depicted caterpillar would represent eyes (Figure 3, see Appendix). Merian's (1998, *Suriname-book* [1705], 46) careful objection that the protrusions neither would have eye-like membranes over them, nor that the caterpillars would seem capable of detecting food to their sides or rear, which they clearly could if they had eyes all around their body, however, is blatantly passed over by the authors. Gender issues seem to be one side of the coin for such ignorant dismissal. The other side, however, is revealed by Kirby and Spence's characterisation of Merian's account of an ant-bridge as "imperfect," Macleay's insinuation of Merian's

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<sup>11</sup> Kirby and Spence refer to *Voyage dans l'Amerique meridionale depuis 1781 jusqu'en 1801* published in 1809 by Félix de Azara (1746–1821), a Spanish military officer and naturalist.

story on bird-eating spiders developing into a “pictorial lie” and Guilding’s excoriation of extravagance in the *Suriname-book*. These verdicts mirror Descartes’ mistrust of aesthetic perspectives and epitomise the restriction of acceptable cognitive experiences as an important element of Modern sciences. “Observation, from the seventeenth century onward, is a perceptible knowledge furnished with a series of systematically negative conditions. Hearsay” – as Guilding’s criticism of Merian’s *Suriname-book* makes particularly evident –

is excluded, that goes without saying; but so are taste and smell, because their lack of certainty and their variability render impossible any analysis into distinct elements that could be universally acceptable. The sense of touch is very narrowly limited to the designation of a few fairly evident distinctions (such as that between smooth and rough); which leaves sight with an almost exclusive privilege, being the sense by which we perceive extent and establish proof, and, in consequence, the means to an analysis *partes extra partes* acceptable to everyone. ... Even then, everything that presents itself to our gaze is not utilizable: colours especially can scarcely serve as foundation for useful comparison. The area of visibility in which observation is able to assume its powers is thus only what is left after these exclusions: a visibility freed from all other sensory burdens and restricted, moreover, to black and white. (Foucault 2002, 144–5)

In this epistemological context, it becomes obvious that Merian’s oeuvre is conceived as compromised by a hopelessly irrational cognitive quality, her gender conveniently playing into the dismissal of her work as non-scientific. Rather than merely perceiving the content of her images as dubious, such as the depiction of the bird-eating of spiders or bridge-building ants, it is actually the very artistic-aesthetic form of her entomological studies that meets with disapproval. In stark contrast to seventeenth and eighteenth century scholars, who saw Merian’s artistic talent still as particularly well qualified to represent the natural world, nineteenth century naturalists in response to the spreading of the quantitative epistemological ideal perceived the exuberant and vivid colours, the sensory richness and invigorating

quality of Merian's pictures as distracting from nature's apparently true character and functioning. Whereas her work certainly appeals predominantly to the eye, in contrast to the black and white vision of Modern science, she nurtures a kind of visual perception that, in the eyes of Modern entomologists, distracts and lacks in focus. However, this is precisely where their invaluable attraction lies. Highlighting a mismatch in the depiction of butterfly and larva on plate 50 of the *Suriname-book*, entomologist John Westwood's (1805–1893; 1839, 229) claim "that the authoress must have fallen into some error, although it must be observed that the same plate contains figures of *Passalus* in the larva and perfect state, the correctness of which has been ascertained," exposes the challenge Merian's work posed for nineteenth century entomologists (Figure 5, see Appendix). To Westwood, the surprise was not the fact that Merian was wrong – an original sin he most likely would have expected from a woman wandering in the vicinity of the tree of knowledge – but that her depiction proves accurate. Indeed, while Merian's books defy all scientific requirements of objectivity, they prove profoundly illuminating to the flourishing entomological sciences exactly because of Merian's artistic eye and the richness of her representations. Accordingly, entomologists were as much drawn towards them as they were repelled by them. This ambivalence, then, might explain the outrage of critics like Guilding and Macleay, and the ambiguous referencing of her works by others in the nineteenth century.

As a consequence to the increasingly universal acceptance and internalisation of the Modern cognitive paradigm over the course of the twentieth century, this tension disappears largely from scientific consciousness. Merian's work is still present and acknowledged in entomological journals of the early twentieth century,

although mentioning decreases significantly (Dittmar 1917; Eisinger 1910). Instead, in the nineteen-thirties and -forties a reassessment of her work sets in (with Pfeiffer 1931 and Stuhldreher-Nienhuis 1944) that increasingly, albeit moderately, gains momentum throughout the century and finally dislocates it from the sciences completely and reassigns her work to the unscientific realm of art or the prescientific mediaeval era. Throughout this reassessment, the focus shifted almost exclusively to Merian's biography and her work's artistic side, thus further cementing Merian's exclusive classification as an artist. Rather than overcoming the ambivalence in the relationship to her work, however, the sciences merely become more self-assured in disqualifying Merian scientifically. Without the hesitation of his predecessors, the distinguished zoologist G. Evelyn Hutchinson (1977, 22) concludes that although Merian "often succeeded" in describing the entomological wonders of Suriname, her book "is essentially an enormous development of one aspect of late mediaeval illumination" that "indicates an attitude towards nature that could well have been held by her 15<sup>th</sup> century artistic ancestors." Even though her work "set a standard of beauty in conveying information and whetted the appetite of a whole generation of naturalists," according to him Merian "was essentially a connoisseur rather than an investigator of metamorphoses" (ibid.). While this depiction completes the process of expelling Merian from the halls of science and categorises her exclusively, and very anachronistically, as a pre-Modern artist, the tension does not in fact cease to exist, but is merely covered up through an artifice. Hutchinson still acknowledges that Merian's depictions were often correct, while insisting that they radiate a naïve and obsolete concept of nature – a faint persistence of the same contradiction as in Duncan's assessment of Merian's work 150 years earlier. Instead of resolving the

issue, classifying her as a connoisseur allows for recognition of her intricate powers of observation while at the exact same moment consigning her work to the realm of subjective and personal taste, rather than accepting it as a contribution to objective knowledge. As in Duncan's previous appreciation of Merian's achievements, in the twentieth century it is also merely the plates' use by others and the good service they have provided to these researchers in making their ground-breaking discoveries that grants her drawings scientific value – and even this only after “her confusion of stages has been unravelled and modern scientific names have been attached to each individual figure,” while their decorative, aesthetic elements are appreciated “apart” (Stearn 1982, 82) from any cognitive value they provide. Similarly to their nineteenth century predecessors, Hutchinson and Stearn do not recognise any scholarly insights by Merian, but rather the technical, reproductive qualities of her work in respect to the insects, and thus her observational and representational skills, which apparently add nothing substantial, or are even detrimental to our understanding of nature. In contrast though, the growing disciplinary specialisation of knowledge, alongside the incredible self-confidence the sciences have reached and the technical advances in the production of exactly measured quantitative knowledge, does not even allow for the possibility that Merian's plates could represent a significant, let alone legitimate cognitive approach to the comprehension of nature.

On one level then, the reception of Merian's work reflects the rise of the Modern scientific knowledge paradigm with its rejection of aesthetic, subjective perspectives, and its favouring of quantitative, dissecting, reproducible procedures and apparently objective knowledge, with which Merian's work does not formally comply. But at the same time, a self-negating dialectic is set into play on another level

in the assessment of Merian's art, whereby its aesthetic qualities simultaneously provide the argument for exiling Merian from the realm of science and the foundation for the production of scientific knowledge. The plates' scientific value rests on their artistic quality and Merian's exact realistic observational talent, which made her work so valuable to the early investigators of insect metamorphosis. Indeed, when Hutchinson (1977, 22, emphasis added) remarks that Merian depicted the insect world "as she *thought* she saw it," his phrasing establishes a distance between Merian's depictions and reality, which implies the possibility of an unmediated access to nature and represents her perspective as unnecessarily distorting 'true' nature, again belittling her as scientifically simple-minded. Yet both Stearn and Hutchinson, as well as nineteenth century entomologists such as Kirby and Spence, confirm her representations as empirically reliable investigations of their objects, a truthfulness that is achieved not despite but precisely because of Merian's artistic talent. The knowledge which is contained in her depictions of nature and which rests on her artistic mediation of the objects of knowledge hence is dismissed and simultaneously, or at least to a certain degree, acknowledged. Her artistic approach to producing knowledge is thereby nonetheless admitted as in principle effective, and can therefore hardly function as an argument for the rejection of the knowledge she produces. Instead, Merian's empirically captivating insect studies prove so clearly valuable by means of their aesthetic qualities that Merian's work necessitates acknowledgement, while at the same time provoking disqualification because they contradict and challenge the epistemological hegemony of the emerging exact sciences, thus creating a tension within the scientific study of nature itself. Rather than facing this tension, Merian's approach to the study of nature is split into an



artistic and subjectively interpretative component on the one hand and a scientific component on the other. Referring her depictions to the fantastical world of art and historicising their scientific side allows for the containment of that knowledge of nature captured in her depictions that resists or even threatens the knowing subject of Modernity.

As such, the reception of Merian's work reflects the very dialectic of enlightenment uncovered by Horkheimer and Adorno. The duality with which her artistic capabilities are simultaneously scientifically accepted and rejected suggests in turn that instead of her artistry being insignificant to the understanding of nature, Merian captures aspects of her objects of knowledge that evade or are rejected by Modern science. On the contrary, the aesthetic and artistic elements of Merian's oeuvre receive more than merely decorative quality and push their way back into the realm of knowledge. Thus, it is not surprising that interest in the scientific side of Merian's work reawakens exactly at a time at which Modernity's quantitative scientific paradigm is increasingly at odds with negotiating society's experience of nature. However, accepting that Merian simply fell victim to the progress of Modern science ironically affirms indirectly the apparent success of the sciences as the definitive knowledge paradigm for approaching nature – instead of valorising and emphasising art's cognitive function by showing the immanent limitations of science to represent nature. Rather than being insignificant, it seems to be precisely Merian's artistic mediation that fills an incapacity in the knowledge production about nature. Her plates thus are recovered as memory of nature that indeed captures an element of the insects that escapes science.

## The Artist as Naturalist

Merian received artistic training in Frankfurt from an early age, both from her stepfather Jacob Marrel (1614–1681) and from his foremost student Abraham Mignon (1640–1679), who eventually specialised in elaborate flower bouquets often adorned with insects. Marrel himself was a student of the still-life painters Jan Davidszoon de Heems (1606–1683/4), known for his brilliant colours and meticulous depiction of objects, and Georg Flegel (1566–1638), who trained with Dürer and is known, among other subjects, for his flower and bird still lifes as well as nature studies in Dürer's tradition. Also maintaining an art trade in Utrecht, Marrel accordingly was strongly influenced by the prominent artistic trends of early Baroque painting from both German states and the Dutch Republic. (Solbrig 1980, 71) These chains of influence clearly reflect in Merian's work. Seizing on the Renaissance's artistic developments, the mentioned traditions were marked by making the observation of nature the centre of attention and the striving for depiction of objects that were as realistic as possible, which was approached through an artistic-epistemological programme that demanded determination of natural principles and phenomena through mathematically describable regularities (Eusterschulte 1997, 26). During the High Renaissance, these efforts were developed further to rendering reality in its organic vividness. Such objectives were especially cultivated in the Dutch Republic, where artists set out "to capture the exactly observed details: the flower, the birds, the benignly delineated interior, the almost palpably seeming quality of fabrics, jewelleries and receptacles"<sup>12</sup> (Wundram 2004, 15). Finally, during the

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<sup>12</sup> „... wendeten sich hier zunächst der Erfassung des genau beobachteten Details zu: der Pflanze, den Vögeln, dem liebevoll geschilderten Interieur, der fast tastbar erscheinenden Qualität von Stoffen, Geschmeiden und Gefäßen.“

Baroque, the tendencies were inflated to an almost obsessive meticulous precision in the reproduction of details (Broer et al. 1996, 166). Even the compositional arrangement of a painting was directed at reinforcing the realistic and vivid representation of its various elements. Flowers and birds, and to a lesser degree also insects, were particularly widespread subject matters during this time (ibid.). Merian hence was instructed in an artistic view, which on the one hand was marked by the exact and hyper realistic reproduction of its subject-matter that relied on empirical observation, rather than customs and traditions, and by an incredible attention to detail. On the other hand, paradoxically, this devotion to detail coalesced, especially in flower paintings, with the composition of these images, which is pronouncedly artificial and idealised and thereby reveals the artist's subjective, interpretational and aesthetical idiosyncrasy, even though the artist only intervened in the service of the objects' lively representation. Whereas a painting's individual elements thus are meticulously copied in great and realistic detail, the overall composition accentuates the artist's individual constructional effort. This character stood in stark contrast to nature studies from Antiquity, which strive to deceive the viewer's eyes and disguise the difference between picture and actual nature. The artificial arrangement of seventeenth century flower paintings actually emphasises this difference. (Ludwig 1995, 101) Through the simultaneity of objective and subjective perspectives then, the style characteristics, in their incredible accuracy almost ridiculing, reflect the inescapable subjectivity of an observer's epistemological perspective. Regardless of how accurate and detailed we aim to be in our observations, the specific tension makes explicit that we are always observing from a particular perspective. (Haraway 1988)

Plate 8 of the first and plate 4 of the third part of Merian's *Flower-book* reflect such compositional features vividly (Figures 6 and 7, see Appendix). The pictures' spaces are reduced to one layer in the foreground and the blossoms in particular are depicted with great attention to detail. An empty background allows the flowers to take centre stage, so the viewer's attention is channelled towards their blossoms. Capturing the blossom at the moment of withering, the depiction of plate 8 suspends the flower especially arrestingly within the particularity of its liveliness, as Goethe attributed it to Merian's depictions. Despite its realism, however, the compositional features convey a clear artificial impression. The stark contrast between the detail and precision in copying the flowers and the free artistic arrangement of the picture's individual elements proves especially noticeable in the somewhat chaotic, more lavish and yet highly appealing composition of plate 4. The backgrounds in both images remain white, empty and without any depth, and any light is significantly reduced or completely absent. In plate 4, only short shadows are noticeable, while the arrangement of the plants seems rather random. Additionally, the stalks are artificially tucked into a merely suggested, stylised bit of soil. While the representation focuses on the realistic and detailed reproduction of its individual elements, the empty background, the arrangement of the individual elements and the artificial presentation of the picture's objects in the composition reveal the artificiality and Merian's subjective interpreting hand in the construction of her subject-matter. In respect to both formal aspects (regarding the composition of the pictures) as well as artistic proceedings (concerning the aesthetical arrangement of meticulously exact studies of individual objects obtained through empirical

observation), Merian follows the trends in floral painting of the seventeenth century. (Ludwig 1995, 99; Segal 1998, 74)

Conceived “so that it may be useful for pencilling over and painting, to the woman for sewing, and all enthusiasts sensible to art for use and joy,”<sup>13</sup> (Merian 1981, *Flower-book* [1680], preface, unpaginated) and thus with no natural-historical objective in mind, the *Flower-book* follows merely decorative purposes. The insects that adorn the discussed plates and many others in the books were added to enliven the depictions in the same manner as landscape painters used animals, Merian (1679, *Caterpillar-book 1*, preface, unpaginated) later explains in her *Caterpillar-book*. She thus did not invent the insect study, and her reference reflects that insects were already popular as staffage in still-life and landscape paintings, where they generally occupy the role of animating the compositions since viewers associate movement with them. (Ludwig 1995, 104; Neri 2011; Wettengl 1998a, 22) As the publication of the first *Caterpillar-book* in 1679 suggests, however, Merian’s interest in insects exceeds their mere deployment as compositional devices and decorations. Although little biographical or personal writing of Merian is handed down, in the first entries of her *Study-book* Merian (2011, *Study-book* [1660–1713], 141, 143) notes that she indeed had applied herself to the study of Lepidoptera as early as 1660, when she was just thirteen years old, and therefore parallel to learning her artisanship (see also Wettengl 1998a, 17). Explicating in the foreword to the first *Caterpillar-book* that “I was always zealous to decorate my flower paintings with caterpillars, butterflies and such little creatures alike,” Merian emphasises that she eventually,

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<sup>13</sup> „Damit solches so wol zum Nachreissen und Mahlen/ als dem Frauenzimmer zum Nähen/ und allen kunstverständigen Liebhabern zu Nutz und Lust dienstlich seyn möchte.“

by means of the silkworms, became aware of the transformation of their caterpillars and started wondering, if a similar transformation takes place in those others as well? Since then, after diligent and lengthy examination, I finally had found as much that this manner and way of transformation is almost always the same ... and observed quaint transformations.<sup>14</sup> (Merian 1679, *Caterpillar-book 1*, preface, unpaginated)

Singling out the metamorphosis of caterpillars as a central subject-matter of her investigations and relating her nature studies to her artistic practice, Merian spent a substantial amount of energy on her investigations. Continuing her introduction, she explains that she had monitored her research objects for five years before the experiments delivered the first decisive results (Merian 1679, *Caterpillar-book 1*, preface, unpaginated).<sup>15</sup> It also took her almost twenty years from the earliest entries in Merian's *Study-book* to the first appearance of results in print (Reitsma 2008, 69). Giving an impression of the numerous steps and measures she employed to reveal the secrets of metamorphosis, Merian explains

that it took me a great deal of effort and time to look for such little animals, to give them their food for many days, even months; for if they do not get their customary nourishment, they either die or spin a cocoon around themselves.

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<sup>14</sup> „Dieweil ich meine Blumenmahlerey mit Raupen/ Sommervögelein/ und dergleichen Thierlein auszuzieren/mich jederzeit befließen ... : [Also hab ich oft grosse Mühe in Auffangung derjenigen angewandt/ bis ich endlich/] vermittelst der Seidenwürmer/ auf der Raupen Veränderung gekommen/ und denselben nachgedacht/ ob nicht dort auch eben dergleichen Verwandlung vorgehen möchte? Da ich dann nach/ nach fleissiger und langwieriger Untersuchung/ endlich so viel befunden/ daß diese Manier und Veränderungsart fast einerley sey ... und wunderliche Veränderungen erfahren.“

<sup>15</sup> „Eine dergleichen ... Raupe, ist, 1672, auß Regenspurg ... von mir angenommen worden, welche, (ob ich zwar von ihr noch lebendig empfinde, und aber ihre ordentliche Speise nicht verstunde noch Damals wuste,) mir alß unnützlich (so zu sagen) Verstorben und verdorben ist. Nun vorm 1684 Jahr, hatte ich wohl, 5 Jahr nacheinander, dergleichen Raupen=Wurm wieder gehabt, bekame aber auß keinem, ob Sie zwar Alle Ihre Ordentliche Speise von mir empfangen, seinen generative, oder general, daß ist, ordinari Mottenvogel ... Theils Raupen verfauleten gantz, und sind große Madenwürm darinnen gewachsen, kamen also grosse Fliegen darauß. ... Welches aber alles, mir an Statt der Natürlichen Veränderungen, mir nur lauter Accidental, falsche, oder Unnütze Veränderungen, gezeigt, Und gelehret hat“ (Merian 2011, *Study-book* [1660–1713], 241).

Of those, I have drawn quite a few immediately, some later and already half transformed, others often altogether transformed completely; and drawn again as soon as they have cocooned or hanging as well as recumbent transformed completely into a date kernel<sup>16</sup> to only then become aware of what finally comes out of it: in the case that something exceptional occurs, ... I newly depict the occurrence from real life with most care; and also diligently draw the same again if wrong transformations occur.<sup>17</sup> (Merian 1679, *Caterpillar-book 1*, preface, unpaginated)

What Merian considers as exceptional occurrences and wrong transformations remains uncertain. By documenting all outcomes of the transformation processes she observes, however, Merian reveals on the one hand a generalised account of natural-historical developments and produces standardised knowledge. Yet on the other, she also makes transparent and compiles a logbook of the possible variance in the developments of her research objects and thus the nonidentity of each individual

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<sup>16</sup> In the first *Caterpillar-book*, Merian (1679, *Caterpillar-book 1*, preface, unpaginated) develops a (incomplete) classification for the different developmental stages. All caterpillars originate in “seeds,” but only if the “birds” have mated beforehand. Although acknowledging that different terms are being used for the pupae, she refers to them generally as “date kernels” if they are attached to something and hang upside down, justifying this terminology with the pupa’s resemblance of a date kernel and her personal habit. If, however, the pupa lies in an unattached case, she calls it “cocoon” or “egg.” Maggots and worms, in contrast, she explains develop mostly from “decayed caterpillars or other filth, also from the caterpillars’ waste,” spinning into “eggs.” The winged adult stages she finally separates into those that hatch from date kernels and calling them “summer-birds”, as they can be found primarily during the summer. Those that hatch from eggs or cocoons and which fly during the nights and distinguish themselves by their large heads, are referred to as “moths,” while all others are named “gnats” or “flies.”

<sup>17</sup> „... daß es mich große Mühe und Zeit gekostet / solche Thierlein zu suchen / ihnen ihre Speise viele Tage / auch Monaten zu reichen ; denn wofern sie ihre gewöhnliche Nahrung nicht bekommen / so sterben sie entweder / oder spinnen sich ein. Derer nun hab ich etliche alsobald / manche späther / als schon halb verändert / andere oft gantz und gar / von haut und Haar verändert / abzeichnen ; und so bald sie sich eingesponnen / oder gantz in einen Dattelkern so hangend als ligend verändert / wieder abmahlen / und dann erst / was zuletzt daraus werden möchte / gewärtig seyn müssen: So sich nun etwas sonders ereignet / hab ich mich die Mühe um so viel desto weniger verdrüssen lassen / dasjenige abermal / mit höchster Sorgfalt / nach dem Leben abzubilden ; und wofern sich falsche Veränderungen darbey ereignet / dieselbe fleissig wieder abzuzeichnen[: Und mir ferner fürgenommen / bey jeglicher Gattung / mit wolgeleister Hülfe meines Eheliebsten / dero nach dem Leben abgemahlte Speisen hinzu zu fügen.]“

transformation she observes. At the same time, she creates with this practice a logbook of her research activities which also includes the failures of her detailed empirical work. Her *Study-book* thus is a testimony to this dialectic of her research between the uniqueness of the empirical and the generalisation of knowledge.

Merian's studies were accordingly capacious and complex and she carried them out with great care and assiduity. She collected specimens in gardens, fields, meadows and hedges around her hometown (cf. Merian 2011, *Study-book* [1660–1713], 153, 155, 163, 173, 213, 227). For animals that were sent to her, however, she had no use, as she explains for example to James Petiver, since she was looking for “the generation and reproduction and transformation of the animals, and how one emerges from the other, and the properties of their food, as the gentleman can see in my book” (to Petiver from 27 April 1705, in Merian 1998, *Letters* [1682–1712], 268, original translation).<sup>18</sup> She even gave up a box of Surinamese butterflies to Petiver, because the person Merian received them from “was unable to tell me about their generation. Thus I cannot use these, either, for my purpose”<sup>19</sup> (ibid.). In endeavouring

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<sup>18</sup> Merian states the same reason for her expedition to Suriname. In the collections of Nicolaes Witsen (1641–1717), mayor of Amsterdam and administrator of the Dutch East India Company, Jonas Witsen (1676–1715), State secretary of Amsterdam, and the botanist and anatomist Frederick Ruysch (1638–1731), she saw many insects, Merian (1998, *Suriname-book* [1705], 8) explains, “but in such a way, that their origin and reproduction was missing, that is, how they change from caterpillars into pupae and so on. This motivated me, to undertake a big and expensive journey and travel to Suriname ... to continue my observations there.” [„... aber so, daß dort ihr Ursprung und ihre Fortpflanzung fehlten, das heißt, wie sie sich aus Raupen in Puppen und so weiter verwandeln. Das alles hat mich dazu angeregt, eine große und teure Reise zu unternehmen und nach Surinam zu fahren ... um dort meine Beobachtungen fortzusetzen.“]

<sup>19</sup> „... den was ich suge von gethierte, ist ganß einer andere sach, ich sugte keine andere gethierte, als nur die generatiy und fortpflanzung und veränderung der gethierte, wie eines auß dem anderen fort kombt, und was die eigenschafft ihrer Speise ist, wie der herr in meinem Buch sehen kann. ... auch konnte er mir keinen



to decipher and verify the genesis and metamorphoses of the insects, the crucial requirement to establish different individual manifestations as one species was to observe and track the complete transition a specimen undergoes from its eggs and hatching via its moulting and pupating transformations through to its final, mature, adult, winged stage. Her research relied on tenacity, perseverance and not the least a fair amount of luck and presumably was often frustrating, since it was far from certain that any of her efforts would lead to success and probably rather frequently did not lead anywhere.

To be able to observe the transformations properly, Merian took the collected specimens home to rear and breed them in boxes. Through close observations, or sometimes presumably trial and error, Merian had to determine the plants that provide them proper nourishment. She was not always successful in finding the correct food plants of her specimens though. Thus, when she found a “curved brown caterpillar, on May third, beneath a birch tree, but when I gave it such leaves to feed on, it did not take any; therefore I do not know the food it takes”<sup>20</sup> (ibid., 159). Once the caterpillars had pupated, she had to keep the environmental conditions right and make sure that no parasites lodged in the boxes, displacing the actual specimens. Of the silkworm, for example, she explains that

one has to ... look after them, so that one does not ruin them by strong touch or suchlike; one must also not give them wet leaves, or other foul things, as they get ruined, fall ill, and die. ... When a thunderstorm is approaching, and there is lightning, one has to cover them, otherwise they get jaundice or dropsy. They

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Bericht geben, von ihrer generaty, so das ich sie auch nicht gebrauchen kann, zu meiner intentiy.“

<sup>20</sup> „Folgende gebigene braune Raupe, habe ich, den dritten May, unter einem Birckenbaum gefunden, da ich ihr aber von solchen Blättern zu essen gab, hat sie nichts zu sich genommen; also daß ich die Speise, so sie gewiß zu sich zu nehmen pflegt, nicht weiß.“

also die when one gives them too much food.<sup>21</sup> (Merian 2011, *Study-book* [1660–1713], 141)

In one case, “when I forgot for once to clean out [a box], I noticed white maggots or worms under [the caterpillars’] waste”<sup>22</sup> (ibid., 153). As some species take several months to transform, the dangers of infestation or life-threatening changes occurring in the conditions that could lead to a specimen’s decay aggravate respectively. On one occasion, despite finding “large golden-black caterpillar in large quantities in the year 1677 in the grass in Altdorf’s moat,” when she tried to rear them

nothing came out of them but rot; and even though I got them oftentimes the following year again, and attended to them with great care, and all kinds of ingenuity to bring them to their transformation, they might well went half on living through the winter, but eventually they perished and sludged.<sup>23</sup> (Ibid., 227)

Another species of caterpillars Merian “had had three years in a row, and, after a lot and great effort, might well had gotten a few date kernels, but no birds from it” (ibid., 149). Only “in the fourth year of my examination in February with great delight this single moth bird, which only flies at night, emerged from one date kernel”<sup>24</sup> (ibid.).

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<sup>21</sup> „... man muß ... auf sie achtung geben, daß man sie nicht verderbe, mit starken anrühren oder dergleichen; Man muß ihnen auch keine Nasse Blätter geben, oder sonst faules, sonst verderben sie, werden krank, und sterben. ... Wenn ein Gewitter kommen will, und es blitzet, so muß man sie zudecken, sonst bekommen sie die Gelbsucht oder Wassersucht. Sie sterben auch, wenn man Ihnen gar zu viel zu essen giebt.“

<sup>22</sup> „... alß ich einsmal das außbutzen [einer Schachtel] Vergaß, nahme ich weisse Maden oder Würmer, unter [der Raupen] ihrem Unrath auf dem Boden, in acht ...”

<sup>23</sup> „Diese grosse goldgelb=schwarte Raupe ... habe ich in grosser Menge Ao. 1677 im Stattgraben zu Altdorff, (da die Universität von Nürnberg ist) gefunden im Graß ... Aber es ist mir nichts darauß worden, sondern gar verdorben; und ob ich sie gleich folgende Jahr noch öfters bekame, Und mit grosser Sorgfalt ihnen auffgewartet, und allerhand Inventionibus umb ihnen zu ihrer Veränderung behuf zu geben, so blieben sie wohl den winter durch halb so leben, aber endlich verschliessen oder Verschleimten sie.“

<sup>24</sup> „Ich habe sie 3 Jahre nacheinander gehabt, und, nach viel und groß gehabter Mühe, wohl einige Dattelkerne, aber keine Vögelein darvon bekommen, biß endlich im vierdten Jahr meiner Untersuchung im february mit grossen Wohlgefallen dieses

When flies hatched instead of the adult stage of the examined caterpillar, she could not always be aware of such displacements, since her research was treading unknown ground, and at times she mistook the flies for the caterpillar's legitimate adult stage. Despite this arduousness, through the combination of field work, experimentation and painstaking pertinacity, Merian was able to establish the lifecycles and different developmental stages of hundreds of species, (Friese, 2011) attesting to the carefulness, dedication and aptness with which she pursued her research.

Accompanying these empirical investigations and experiments, Merian diligently recorded her observations as they occurred both in writing as well as in drawing. When caterpillars started spinning a cocoon around themselves right after she had found them in the evening, she even "still had to draw them that night," since "at the dawn of day it had spun in completely, in the form as seen in the second parchment above the caterpillar along its date kernel"<sup>25</sup> (Merian 2011, *Study-book* [1660–1713], 157). The fruits of this labour are compiled in her *Study-book*.<sup>26</sup> Her

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einige Mottenvögelein, welches nur deß Nachts fliegt, herauß aus einem Dattelkern kommen ist."

<sup>25</sup> „... ich bekame sie des Abends, und begunte sich einzuspinnen, so, daß ich deß Nachts Sie noch muste abmahln; und bey anbrechendem Tage war Sie eben eingesponnen, in der Gestalt, die im zweyten Pergament über der Raupe samt dem Dattelkern zu sehen ist.“

<sup>26</sup> The book, which is kept as an album in the Academy of Science in St. Petersburg, contains watercolour studies on parchment accompanied by notes further explicating her research. Studies and notes are correspondingly foliated. The origin of the *Study-book* cannot be definitely established, but Beer (2011, p. 59–60) convincingly argues that Merian started the journal around 1683 to compile the loose papers with notes and studies that had accumulated over the span of her research for the first two *Caterpillar-books*. It is certain that the entries were made over a long period of time, with Merian often only relegating the notes to the *Study-book* after years and subsequently complementing entries, for example when she had published a study. The *Study-book* therefore functioned for collecting and storing her results as well as for the lucid sorting of her estate. Both the texts as well as the pictorial studies were

illustrations are drawn on parchment, reproducing the different developmental stages with distinguished artistic vigour and a steady hand for detail, often alongside depictions of their eggs and excrements, arranged either vertically or horizontally and occasionally rather arbitrarily (Figure 8, see Appendix). To produce these studies, she relied on both preserved as well as living specimens (Reitsma 2008, 186). “Everything I did not need to paint” in Suriname, she explains to the botanist Johann Christoph Volckamer (1644–1720) in Nuremberg, “I have brought with me, such as the butterflies and beetles and everything I was able to preserve in brandy as well as everything I was able to dry. I am painting these things now”<sup>27</sup> (to Volckamer from 8 October 1702, in Merian 1998, *Letters* [1682–1712], 264, original translation). Merian hence also proves very apt at conserving the specimens. In a letter to one of her former students (to Scheurling from 29 August 1697, in Merian 1998, *Letters* [1682–1712], 264, original translation), she explains that in order to quickly kill butterflies “one must hold the point of a darning needle in a flame, thus making it hot or glowing red, and stick it into the butterfly. They die immediately with no damage to their wings.”<sup>28</sup> There are also instances in which Merian (2011, *Study-book* [1660–1713], 265, 291, 293) dissected frogs and snails, although it is noteworthy that neither the paintings accompanying the entries where she reports her operations nor later compositions involving the same species comprise any representations of dissected

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used in Merian’s books. Especially the texts of the *Caterpillar-book* differ only marginally from the ones in the *Study-book*.

<sup>27</sup> „Alles das ich nicht vonnöten hate Zumahlen, habe ich mit gebragt, als die Sommervögelein und kefter und alles was ich in brandenwein kont legen auch alles das ich konnte drucknen, das mahle ich nun darbey.“

<sup>28</sup> „... so hält man die spitze der spännadel in ein licht und macht es so heiß oder glühend, und steckt es in das SommerVögelein, dan seindt sie alsobalde thot, und bleiben dan die fligel uhnbeschädiget.“

specimens; she obviously was interested more in the intact individual than its parts (see also Reitsma 2008, 86).

Indispensable to this work was the microscope or magnifying glass. Allowing the researcher to see features indiscernible to the naked eye, it enabled her to better distinguish between different species of insects. The large number of caterpillars that are green, for example, can be divided by examining them “either with the microscope” or “a so called magnifying glass”<sup>29</sup> (Merian 1679, *Caterpillar-book* 1, 33). The device also allowed Merian to reproduce her research objects as vividly and exactly as possible (cf. Reitsma 2008, 108). “Viewed through the magnifying glass, the dust on” a hawkmoth’s wings in the *Suriname-book* “looks like brown, white and black feathers of multi-coloured chicken. The body is as hairy as that of a bear. There are even hairs on the eyes. The trunk looks like the neck of a goose or a duck”<sup>30</sup> (Merian 1998, *Suriname-book* [1705], 14). The texts finally complement the pictorial accounts with information about the plants on which she found the specimens or how she had acquired them, the foods she tried to rear them with and the success of these efforts, the objects appearance and behaviour, the sequence of their transformation including its duration, changes and stages (often providing dates), the final results of the process as well as the book in which Merian published the studied transformation.

The *Study-book* demonstrates how systematically and purposefully Merian pursued her studies (Wettengl 1998a, 20–2). Only 44 of its 555 studies were not used

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<sup>29</sup> „... entweder mit dem Microscopio, einem so genannten Vergröß-Glas / oder gar mit der Raupen Einsetzung / Pfleg- und Unterhaltung / untersucht.“

<sup>30</sup> „Durch das Vergrößierungsglas betrachtet, sieht der Staub auf den Flügeln aus wie braune, weiße und schwarze Federn von bunten Hühnern. Der Körper ist behaart wie der eines Bären. Sogar auf den Augen sind Haare. Der Rüssel sieht aus wie der Hals einer Gans oder einer Ente.“

in one of her publications, and the journal's size, accumulating over a period of some fifty years, accounts for the diligence, seriousness and regularity Merian shows in her pursuit of the secrets of metamorphosis (Reitsma 2008, 90).<sup>31</sup> Finds in houses or even coincidental ones, for example in dead birds prepared for food in her kitchen or in dead mice, exemplify that she was always on the alert and confirm the centrality of her interest in natural history (Merian 2011, *Study-book* [1660–1713], 195, 205, 217, 229, 223). The early *Caterpillar-book*'s foreword, which provides a lengthy general account and introduction to generation and transformation of butterflies, further underlines the book's natural-historical and scholarly character (Merian 1679, *Caterpillar-book 1*, preface, unpaginated). On the one hand, these properties lend certain credibility and validity to her research practice and discoveries. On the other, both the empirical and experimental proceeding in her studies, as well as the way in which she recorded her observations, suggest that Merian took a genuine, analytically pursued cognitive interest in her research objects. The intensity and diligence of her involvement with the objects by far exceeds the requirements for using the animals as compositional subject-matter for painting purposes. Despite the exceptionally high artistic level at which the studies are produced, the purpose of her efforts was obviously to study nature and reveal the secrets of lepidopteran metamorphosis, not to collect material for the decoration of her still-lives. The examination of lepidopteran natural history was not a mere pastime for her, but a systematic, earnest

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<sup>31</sup> The *Study-book* shows 318 positions, of which 288 texts and 290 watercolours remain today (Lebedeva 2011, 42). The descriptions, both textual and pictorial, seem to comprise all transformations and species she observed, including unsuccessful ones. Represented are *Hymenoptera* (sawflies, wasps, bees, ants), *Diptera* (flies) and *Coleoptera* (beetles), but *Lepidoptera* (moths and butterflies) provide by far the biggest portion. (Friese 2011, 416)

undertaking that was supposed to reveal and establish knowledge about the processes of metamorphosis.

Since the notes and paintings of the *Study-book* provide a more sober outlook on the research objects than Merian's published works, its depictions have been likened to the works of other entomologists of the seventeenth and eighteenth century, whenever the scientific character of her work is supposed to be stressed (Ludwig 1998, 54; Reitsma 2008, 85–90; Wettengl 1998a, 20–2). However, while in comparison to Merian's volumes on European and Surinamese insects, the *Study-book's* form is indeed much closer to the works of scholars like Thomas Mouffet (1553–1604), Swammerdam and van Leeuwenhoek, her journal accounts nevertheless already differ quite considerably from these, especially her pictorial studies. Even Johannes Goedaert (1617–1668), whose work generally is considered the closest to Merian's, (Reitsma 2008, 69–72; Wettengl 1998a, 24–5) follows quite different representational strategies. While Goedaert's texts (cf. Goedaert 1662) accompany individual plates in the same way as Merian's, for example, Swammerdam's text (cf. 1738) does not describe individual observations but is organised along an ordering system based on the physical appearance and properties of the insects he had developed from his empirical research. The depictions these two distinguished entomologists provide in their works appear plain and schematic (Figure 9, see Appendix). Stringing up the different stages in rows, they provide a highly iterative and static view of the objects. Not only do they fall short of the artistic quality of Merian's work, they seem stiff, rigid and lifeless. Developments are regularly incomplete, and Swammerdam in particular dissects his research objects visually and often just produces illustrations of parts, or functional units of the body.

Whereas Merian's depictions in the *Study-book* comprise similarly isolated perspectives of the research objects (in opposition to the integrated perspectives of her publications), hers are not nearly as standardised as Goedaert's and Swammerdam's illustrations, and they convey a very different qualitative perception of the study objects. Applying great artistic rigour in the reproduction of her specimens, Merian depicts her objects not in identical poses or visually dissected, but with bodies intact and frozen in movement. Wings in a slightly upright position, the adult stage of *Biston betularia* (Linnaeus 1758)<sup>32</sup> on sheet 13, for example, appears as if it had just placed itself in position to lift off after having deposited its eggs on the parchment (Figure 10, see Appendix). While Merian's drawings are exact depictions of the research objects, they are not standardised illustrations that follow a rigid pattern but carry with them an aesthetic stylisation that succeeds in breathing life into the *Study-book's* depictions. Goedaert's and Swammerdam's plates are indeed nothing more than illustrations that are supposed to clarify certain elements of the texts. Ironically, despite being drawn from models she had killed with great dedication particularly for this purpose, Merian's pictures, on the contrary, are accounts in their own rights of the depicted insects that capture them in their aliveness. They are individual, artistic studies that complement and indeed exceed the textual descriptions, while they are obviously at the same time not final but provisional products to be worked with further.

The differences indicate that Merian took a cognitive approach to her research objects that contrasts with Goedaert's and Swammerdam's. As the foreword to the *Caterpillar-book* suggests, Merian's interest in lepidopteran natural history developed

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<sup>32</sup> Scientific names of species are retrieved from Schmidt-Loske (2009).



in close proximity to her art training. In the *Suriname-book* she explains the development of her compositional idiosyncrasies similarly, but explicates more distinctly her close intertwining of art and research:

I have engaged since my youth in the research of insects. First, I began with silkworms in my native town Frankfurt on the Main. After that, I realised that from other caterpillars developed much more beautiful butterflies and owl moths than from silkworms. This brought me to collect all caterpillars I could find, to observe their transformation. ... At the same time I wanted to practise the art of painting and draw and describe them all from nature, in the same way I also painted all the insects, which I had been able to find first in Frankfurt and afterwards in Nuremberg, for myself on parchment.<sup>33</sup> (Merian 1998, *Suriname-book* [1705], 7)

Although being just as analytical or driven by the desire to produce knowledge about the insect world as her colleagues, Merian approached and studied her research objects with the eyes, hands and means of an artist at every step of her research process. Neither supplanting nor simply continuing her artistry, the *Caterpillar-book* thus rather pays testimony to a change in Merian's priorities from decorative to scholarly consideration of insects in her work. This change makes the study of nature, and in particular the genesis and transformation of caterpillars and butterflies the primary focus of her work, as opposed to the production of decorative artworks. However, the artistic rigour which she applies to the study of insect natural history is tightly woven into her approach to nature and an integral part of the research process, not subsequently superimposed for the production of her publications.

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<sup>33</sup> „Ich habe mich von Jugend an mit der Erforschung der Insekten beschäftigt. Zunächst begann ich mit Seidenraupen in meiner Geburtsstadt Frankfurt am Main. Danach stellte ich fest, daß sich aus anderen Raupen viel schönere Tag- und Eulenfalter entwickelten als aus Seidenraupen. Das veranlaßte mich, alle Raupen zu sammeln, die ich finden konnte, um ihre Verwandlung zu beobachten. ... Dabei wollte ich mich zugleich in der Malkunst üben und sie alle nach der Natur zeichnen und beschreiben, wie ich auch alle Insekten, die ich zunächst in Frankfurt und danach in Nürnberg habe finden können, für mich selbst auf Pergament gemalt habe.“

## Picturing the Nether Life

Merian is best known, of course, for her books on the metamorphosis of insects, particularly *Metamorphosis Insectorum Surinamensium*, which earned her harsh criticism from entomologists and the reputation to be an artist rather than an investigator of metamorphosis. Indeed, the artistic element, which is present in her research notes but restricted in its use to reproducing the specimens as lifelike, vivid, exact and realistic as possible, receives more weight and prominence in these publications and gains a different quality. Instead of visually dissecting her research objects and presenting them in isolation and strung up in (often incomplete) rows of individual studies, as it is standard in Modern entomological literature, Merian artistically processes her studies into aesthetically pleasing compositions based on the motifs' visual and ornamental correspondence, which emphasise their natural beauty. These images seem to bring the objects of representation to life rather than to prepare them for classification and appropriation. Yet despite this artistic manipulation, she neither seems to leave the realm of knowledge nor to fall back behind her scholarly insights of the *Study-book*.

At first glance, the illustrations of her insect books generally resemble her flower paintings, and thus seem to simply resume her work as decorative artist. Merian deploys visual strategies, compositional techniques and design imperatives similar to the ones she had learned in her stepfather's workshop and that are displayed in her *Flower-book*, such as the stylised bits of soil in which she tucks the plants, the flattened picture-plane, and the empty background (for example Figure 12, see Appendix). A closer look however reveals that Merian makes significant compositional changes that affect the structure and meaning of these

“metamorphosis pictures” (Ludwig) in comparison to her flower paintings. Through the arrangement of the insects on the sheet, Merian draws the viewer’s attention from the plant to the insects. Rather than decorating the flower, the plant serves as compositional support for the presentation of the insects. Although it still occupies the central spot of the composition, it recedes in its importance and becomes equal or even subordinate to the animal. By placing a specimen in the sheet’s top corner, for example, Merian balances the composition and lends weight to the insect, a strategy she regularly employs to this end. The flowers (which were obviously the central motif in her paintings for the *Flower-book*) become the secondary element, while the insects (formerly the secondary elements) take over as the central motif. Another technique she incorporates to this end is the adjustment of size and scale of the depicted insects and plants. The animals, depicted life-sized, dominate the plates while the size of the section of plant is adjusted in size to serve the insects’ representation. Additionally, holes in some leaves which indicate bite-marks visually construct a relationship between insects and plants, something which becomes particularly obvious, for example, on the first *Caterpillar-book*’s plate 9, in which a caterpillar is depicted gnawing at a cherry leave, but also on various plates of the *Suriname-book*, such as plate 50, which depicts a fat white caterpillar devouring a yam in the lower right corner (Figures 11 and 5, see Appendix).

Employing these compositional techniques, Merian directs the attention to relationships among the individual elements of the natural world she depicts (Ludwig 1995, 1998; Neri 2011; Schmidt-Linsenhoff 1998). The arrangement of the main elements of the picture against a white background and next to each other, with minimal overlapping, in patterns of negative and positive space “creates

compartment-like areas that frame the insects” (Neri 2011, 167). Providing little spatial depth, this strategy creates a clearly ordered, highly accessible composition, which conveys information particularly well. While in the *Flower-book*’s illustrations this aids copying, in her metamorphosis pictures it allows for clear recognition and study of the specimens. Within this approach, she strives just as before for the detailed, life-like representation of the different pictorial elements. To further increase the visibility of details in her representations, Merian presents her primary motif, the adult butterfly, in flat as well as in profile view, which simultaneously lends also further compositional weight to the butterfly in relation to the plant. Her compositions follow instructive objectives, rather than exclusive aesthetic considerations, and the composition is construed to educate the viewer about the natural phenomena depicted. Further developing the baroque painterly tradition she emerges from, Merian employs its stylistic tools to produce representations in which the individual elements visually correspond with each other consistently throughout the composition in a way that emphasises the objects’ beauty, breathes life and uniqueness into them and creates an aesthetic and almost sensory experience of them – aspects which Modern scientific production of knowledge precisely excludes, hence the scientific devaluation of her depictions.

The text cements the knowledge character of her insect books. Her explanation to plate 39 of the *Caterpillar-book*’s second part begins with the disclaimer that she presents the kale without its flower because a flowering one is depicted already in plate 45 of its first part (Figures 12 and 13, see Appendix). By making her compositional decisions explicit, she suspends the aesthetic contemplation while justifying the kale’s repeat depiction suggests a rationale that aims at conveying

knowledge, both of which further distances the composition from exclusively decorative objectives. Her text then continues to describe the caterpillar in the centre of the sheet, before attending to the one lying underneath the kale:

They are grass-green, have a yellow stripe across their whole back and at the bottom of every joint a yellow dot, while the other ones [of plate 45, AK] are light-green and marked with many black dots. They both cause great damage to the cabbage, which they eat with great avidness. Eventually, this species of caterpillars [of plate 39, AK] pushes off their complete skin, betake themselves to their transformation and hang themselves on either a wall or attach themselves to the cabbage, at which point they become a date kernel; of which one is seen hanging down at the cabbage's stem, which has the colour of wood and is marked with black dots. They remain hanging in such alteration for fourteen days, before a white summer-bird comes out as one is located at the top flying and one sitting. These summer-birds are prurient and can be found in great amounts next to each other as long as the warm summer remains. They prefer to lie their eggs on the cabbage, so that when the young caterpillars crawl out they at once find their food. In the case that they do not have any cabbage however, they also eat yellow and white violets.

It was exactly on such a cabbage that I found in August small caterpillars which were green, had a yellow stripe across the whole of their back and a foot on every joint as one sits at the lowest end of the ground. They transformed soon into date kernels, which were very similar in colour to the caterpillar, as one is seen next to the latter. They remained lying in this form for ten days, before such beautiful flies came of them, whose completely black bodies were marked with snow-white blots. They had two beautiful red eyes and six wooden-coloured feet, but were very slow at flying. From this I placed one on the lowest cabbage leaf.<sup>34</sup> (Merian 1683, *Caterpillar-book* 2, 91–2)

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<sup>34</sup> „Diese sind Grasgrün / haben einen gelben Streif über den gantzen Rucken / und auf jedem Glied / untenher ein gelbes Döpflein; jene aber sind liechtgrün / und mit vielen schwartzen Döpflein bezeichnet. Sie thun alle beede grossen Schaden an dem Köhl / welchen sie mit grosser Begierde abfressen. Endlich schieben diese Art Raupen ihre gantze Haut ab / begeben sich alsdann zu ihrer Veränderung / und henken sich an eine Wand / oder auch wohl an den Köhl / daran sie zu einem Dattelkern werden; dergleichen einer unten am Köhlstenglein hangend zu sehen / welcher Holtzfarb / und mit schwartzen Döpflein bezeichnet ist. In solcher Veränderung bleiben sie vierzehnen Tage hangend / alsdann komt ein weisser Sommervogel heraus / wie oben ein fliegender und ein sitzender befindlich. Diese Sommervögel sind sehr geil / und finden sich in grosser Menge beyeinander / so lang es noch warmer Sommer ist: Sie legen ihren Samen gern auf den Köhl / damit wann die junge Raupen heraus kriechen / sie alsobald ihre Speise finden mögen: Im fall sie aber keinen Köhl haben / so essen sie auch wohl gelben und weissen Veil.

„Eben auf solchem Köhl / im August / hab ich kleine Raupen gefunden / welche grün waren / über den gantzen Rucken einen gelben Streif hatten / und an jedem

Merian's description relates the individual elements of the plate entomologically to one another and adds information on their visual appearance, their behaviour and their metamorphoses. The text therefore withdraws Merian's illustrations altogether from a purely decorative imperative and identifies them as empirical, scholarly-analytical descriptions of nature, which however work with aesthetical, compositional strategies of exemplification and explication. Moreover, within the sudden change of perspective between paragraphs from objective observer to first person narration, the same dialectic between generalising and particularising tendencies is at work in her text as in her depictions. Making universal claims about the species and generalising about its members' life-cycles in the first paragraph, Merian speaks as an impartial scientist. The second paragraph, however, switches to a personal narrative, reflecting the particularity both of her research objects, which she found in a particular place and at a specific time and of which she depicted one precisely in the plate, as well as her own particular perspective and personal intervention into the lives of these animals she actually had found. By separating these different points of view and setting them against one another, her account creates a tension between the general level of concepts on the one hand, and the particular, unique level of the empirical object that challenges the preponderance of the general on the other. While Merian hence does not escape thinking's reliance on the objective identification, the integration of the particular through Merian's artistic

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Glied ein Füßlein / wie zu unterst am Ende des Grunds eine sitzt. Sie veränderten sich bald in Dattelkerne / die dem Räuplein an der Farb gantz ähnlich waren; wie neben demselben einer zu sehen ist. In solcher Gestalt sind sie zehen Tag ligend geblieben; alsdann sind solche schöne Fliegen daraus worden / welcher Leibe gantz schwartz / mit Schneeweissen Flecken bezeichnet waren; sie hatten zwey schöne / rothe Augen / und sechs Holtzfarbe Füßlein; waren aber sehr langsam im Fliegen: Davon ich eine auf das unterste Köhlblatt gesetzt.“

perspective on the research objects reveals simultaneously the limits of such thinking, pointing beyond the object's identification to its uniqueness and remembering the nonidentity of object and concept.

Rather than just arising from Merian's occupation as an artist or considerations about ecological communities, the representational regime of her depictions indeed seems to follow the cognitive demands of her research objects.<sup>35</sup> Prompted by the Age of Discovery and an explosion in the discovery of new species, entomologists like Swammerdam, Leeuwenhoek and later especially Herman Boerhaave (1668–1738) were interested in systematising the world of insects; indeed, systematisation was the general primary objective in the study of natural history during Merian's time (Beer 2011b, 86; Van Gelder 1998). As the title of her book *Metamorphosis Insectorum Surinamensium* suggests, Merian, in contrast, looked at and intended to represent and visualise the animals' transformation (Wettengl 1998a). Although Francesco Redi (1626–1697) had verified that insects develop from eggs and that caterpillars turn into butterflies by a succession of metamorphoses with his series of experiments published as early as 1668 as *Esperienze Intorno alla Generazione degl'Insetti* (*Experiments on the Generation of Insects*), the topic of insect genesis was a contested field of inquiry and the common belief was still prevailing

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<sup>35</sup> Kinukawa (2001) and Neri (2011) have demonstrated convincingly how Merian's representational regime is closely interlinked with the European industry of natural history in the seventeenth and eighteenth century and how it answers to the demands of that market. While I do not mean to reject such cultural and economical influences on the particular *execution* of Merian's representational regime within her books, these studies restrict their consideration of Merian's oeuvre with this focus to external factors shaping the form of her representations and ignore the internal dynamics of Merian's oeuvres. They thus continue to distance it from immanent conditions of cognition.

that insects would come into being by spontaneous generation (Parke 2014).<sup>36</sup>

Particularly in writing for a wider audience, as Merian did, the challenge accordingly was to represent the passing of one species through very different developmental stages, as well as to explicate compellingly that the genesis of caterpillars to butterflies was indeed a process in the first place, rather than a sudden, immediate event, and therefore to represent the very different developmental forms taken by the animals as nevertheless belonging to one species.

Merian's representational regime relates directly to this challenge. Grouping detailed studies of the different stages in the life-cycle of one insect-species on its food plant, and further emphasising both the relationship and the temporality (or perishability of the single forms) through the bite-marks, the images strikingly reveal the procedural character and complex dynamic of the development of butterflies and moths in the static medium of painting. Within this, the plant provides the link between the adult specimen and its larval state, as it is the place where the adults lay their eggs and also where the butterfly emerges, thus completing the cycle of transformation. Overstepping strict ecological and relational boundaries further distances Merian's plates from an ecological reading. Thus, a snake complete with its eggs and a lizard are added to Plates 4 and 5 of the *Suriname-book* merely to embellish the plates composition (Merian 1998, *Suriname-book* [1705], 16, 18).<sup>37</sup>

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<sup>36</sup> Redi's book became popularised through its Latin translation *Experimenta circa generationem insectorum* in 1671. The question if Merian knew of the account remains undecided. Based on her preface to the first *Caterpillar-book*, Wettengl (1998a, 24) suggests that she was not familiar with Redi's experiments, while Davis (1995, 152), based on Christoph Arnold's (1627–1685) poem preceding the preface and which explicitly refers to Redi, concludes that she must have been familiar with his work.

<sup>37</sup> It is not quite clear if Merian's claim can be taken completely at face value here. More likely, animals like the snake and lizard were added also to showcase further



Likewise, the “little red worm” on plate 2 is added “merely for ornamentation of the plate” and stems from “dry cochineal” that does not even belong to an “American subspecies,”<sup>38</sup> according to Merian (ibid., 12; Figure 14, see Appendix). Rather than denoting an ecological perspective and connecting the specimen with its ecosystem, then, Merian relies on the depiction of the different elements to bring the process of the insects’ metamorphosis to life (Neri 2011, 154–6).

Within this, the aesthetic element actually proves decisive. By placing and relating the objects aesthetically to one another, that is placing and portraying them on the page in a way that produces a harmonious composition in which the objects’ forms and patterns complement each other, the images begin to coalesce and their elements to communicate and interact with each other, breathing life into the plates and their objects. As a consequence, the animals appear suspended within their movements and activities, rather than statically strung up and deprived of their liveliness, allowing Merian’s representations to show passing moments within a process, open to both the preceding and succeeding moment. The moth on plate 45 of the second *Caterpillar-book*, for example, seems to be merely passing by on Merian’s plate, resting for a while before lifting off again to continue to the next flower in search of more nectar (Figure 15, see Appendix). It appears as a visitor or passer-by, while the butterfly on the *Suriname-book*’s plate 9 is depicted within the process of sucking nectar from a pomegranate blossom (Figure 16, see Appendix). Such direct interactions emphasise the vividness of the plates even further. The caterpillars on

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material from her trip to Suriname and thereby sound the potential (or create) interest for future projects she already had in mind 1702 (to Volckamer from 8 October 1702 in Merian 1998, *Letters* [1682–1712], 265).

<sup>38</sup> „Diese habe ich nur zur Ausschmückung des Blattes hinzugefügt. Sie wurden aus trockener Kochenille herausgesucht, und es sind keine amerikanischen Abarten ...“

plates 7 and 33 of the *Suriname-book* are literally suspended within their bites, frozen within the process of eating (Figures 17 and 18, see Appendix). In Plate 7 one can easily imagine the caterpillar taking a bite the instance before the moment represented in the image, and another bite after it – a completely intact leaf, before the caterpillar devoured it, and a half eaten leaf, as it is represented below the caterpillar. It is almost palpable how the represented specimen slowly works its way up the branch before pupating and re-emerging finally as a marine-blue butterfly, resting on one of the cherry branches before taking off in pursuit of nectar.

Hence, it is the devising of the plates by aesthetically placing the individual elements in relation to one another that creates an expression of the procedural character of the cycle of transformation and writes it into the picture. The way Merian evokes the relationships in her depictions, beyond the straightforward relational elements she includes, indeed proves epistemologically significant. The composition of the paintings and plates is not just a mere technical act to enhance the attraction of her illustrations and appeal to a wider clientele; for mere illustrational purposes she could have just published the studies from her *Study-book*. In contrast, it is an indispensable step in conveying the process of metamorphosis and thus an imperative part of Merian's process of cognition. The production of knowledge does not come to an end with the *Study-book*, but continues within her published books and compositions. Only the compositions contained in her books convey her specific discoveries. Indeed, Merian produced other paintings over the course of her life that lack the specific informative character and content of the depictions in her *Caterpillar-* and *Suriname-books* (Figure 19, see Appendix). The fact that these were not compiled into a book or included in her other publications emphasises the

scholarly character of her publications over a mere artistic disposition just as much as the books' titles, which embrace the metamorphosis and thus a biological process rather than the insects' picturesque appearance as their main feature. In comparison to most of her entomologically inclined contemporaries, however, Merian thereby does not submit her objects to an independent and standardised method of cognition, measuring them up against it, but develops her representations in accordance with the forms and visual, ornamental, as well as biological conditions of her objects of research. Merian reworks the different pictorial motifs of the plates into aesthetically pleasing and coherent images based on and in correspondence to their appearance, and thus individually. The form and hence the knowledge contained in her depictions follows the objects, adjusting her images to the objects, rather than trimming the objects to a method.

At the same time that Merian moves her depictions closer to her research objects by incorporating their aesthetic, empirical idiosyncrasies, however, she distances her illustrations from the objects by the manifold ways in which her subjectivity is inscribed overtly into her representations. This is most notable in the artificiality of her compositions that she maintained from her flower paintings. Even though obviously concerned with a lifelike and scholarly accurate representation, the overall composition of her metamorphosis pictures appears in fact slightly incongruous. On some plates, the two-dimensional flatness of the pictures conflicts particularly awkwardly with the very realistic and three-dimensional portrayal of the represented caterpillars. Although reaching over two separate leaves and being itself configured three-dimensionally, the caterpillar on plate 35 of the first *Caterpillar-book*, for example, appears merely stretching over the flat picture-plane (Figure 20,

see Appendix). The caterpillar at the top of plate 23 of the second *Caterpillar-book*, in contrast, appears flatly floating on top of the three-dimensionally depicted grapevine (Figure 21, see Appendix). In plate 45 of the same book, such a contrast is noticeable again between the liveliness of the moth at the top of the page and the more static positioning of both the large caterpillar and the winged insect at the centre of the sheet (Figure 15, see Appendix). Such simultaneity results from the production process of a metamorphosis picture. Merian devised the final composition from the miniatures in her *Study-book*, in which the specimens are precisely fixated in one position and view (Neri 2011, 169–71). In creating her compositions, she used these studies as a collection of design elements. Instead of conceiving every element of a composition anew, she added the fixed views to a composition, collaging her illustrations. Aside from saving time in producing her paintings, proceeding this way ensured representations of her research objects that remained true to her observations, rather than running the risk of introducing faults by adjusting the portrayal to the composition. While this approach further confirms the scholarly commitment underlying her work, it also creates the contradictory simultaneity of two- and three-dimensionality that produces the artificial, unnatural and slightly incongruous appearance of the composition, creating an awkward and paradoxical impression that distinguishes the illustration, despite its very skilled and true-to-life execution, from a realistic depiction of an actual scene painted from life. Merian's metamorphosis pictures are consequently always self-evidently representations composed by a particular individual, that is, Merian, who has left her mark on the portrayals through the particular technique of composition.

The individual subjectivity comes even more to the fore in her texts, especially of the *Suriname-book*. Suggesting that the *Morpho helenor peleides* (Kollar, 1850) of plate 53 “looks like polished silver covered with the most beautiful ultramarine, green and crimson coloured, indeed indescribably beautiful,” which “no brush can reproduce,”<sup>39</sup> Merian (1998, *Suriname-book* [1705], 114) not only emphasises the limitations of the reproduction and thus explicitly highlights the difference between empirical object and its representation, but also reflects the artificial process of the image-production (Figure 22, see Appendix). Appreciated through the magnifying glass, the *Hamadryas amphinome* (Linnaeus, 1767) of plate 8 “proves gorgeous and it is worth to be looked at properly, as no pen can describe its beauty”<sup>40</sup> (ibid., 24; Figure 23, see Appendix). Merian’s retracing of the change in the perception of the research objects through the magnifying glass additionally reflects the approximate character of the depictions. “When one looks at the two owlet moths” of plate 6

through the magnifying glass, they have hair like Hungarian bears. They are just as beautiful when one looks at them without the magnifying glass, as they are oddly bristly and ugly when one looks at them with its aid. They have hair like ears of barley.<sup>41</sup> (Ibid., 20; Figure 24, see Appendix)

The comparisons Merian deploys here simultaneously connect the viewer with the research objects, indeed encouraging admiration rather than appropriation of the specimens, and emphasise that the representation can only be an approximation of

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<sup>39</sup> „Er sieht aus wie poliertes Silber mit dem schönsten Ultramarin überzogen, grün und purpurfarben, ja unbeschreiblich schön. Seine Schönheit ist mit keinem Pinsel zu wiederzugeben.“

<sup>40</sup> „Wenn man diese Tierchen durch das Vergrößerungsglas betrachtet, erweist es sich als wunderschön, und es ist wert, genau besehen zu werden, da seine Schönheit mit keiner Feder zu beschreiben ist.“

<sup>41</sup> „Wenn man die beiden Eulenfalter durch das Vergrößerungsglas betrachtet, haben sie Haar wie ungarische Bären. So schön sie sind, wenn man sie ohne Vergrößerungsglas anschaut, so sonderbar struppig und häßlich sind sie, wenn man sie mit dessen Hilfe betrachtet. Sie haben Haare wie Gerstenähren.“

the research object, rather than an identical copy. Moreover, when she describes one butterfly as beautiful and another moth as ugly, Merian becomes recognisable as mediating subject through the values and judgements she makes. (Cf. Schmidt-Linsenhoff 1998, 214–219) Thus, she describes the bumps on the bottom of *Helicopis cupido* (Linnaeus, 1758) on plate 10 (invisible in her depiction) as being coloured “in the world’s most beautiful colours,”<sup>42</sup> (Merian 1998, *Suriname-book* [1705], 28) while the wine and spirit of the pineapple in plate 2 “are both of marvellous taste and surpass all others”<sup>43</sup> (ibid., 12; Figure 14, see Appendix). Finally, she inscribes herself into the representations by communicating her experiences, such as in the caption to plate 45:

The Indians brought me one day a large quantity of these lantern beetles ... and I put them in a big wooden box. At night they made such a noise, that we awoke full of fright and jumped out of bed. We lit a candle, since we did not know where the noise came from in the house. We soon realised that it was in the box, which we opened with astonishment, but threw to the ground with even more astonishment, as a fiery flame came out once while we opened it. There came out many an animal and therefore many a fiery flame. But we calmed ourselves, collected the animals and wondered at their glow.<sup>44</sup> (ibid., 106)

In complete opposition to Descartes, who insists that wonder needs to be controlled and ultimately overcome, Merian not only retains wonder in the face of the natural world but even augments it through her representations of the research objects, both in her images and writing. Thus, the viewer becomes acquainted with the object in a

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<sup>42</sup> „... in den schönsten Farben der Welt.“

<sup>43</sup> „Beide sind von herrlichem Geschmack und übertreffen alle anderen.“

<sup>44</sup> „Die Indianer brachten mir eines Tages eine große Menge dieser Laternenträger (ehe ich wußte, daß sie nachts so einen Glanz von sich geben), und ich tat sie in einen großen Holzkasten. Nachts machten sie solche einen Lärm, daß wir voller Schrecken erwachten und aus dem Bett sprangen. Wir entzündeten eine Kerze, da wir nicht wußten, was im Haus für ein Lärm war. Bald wurden wir gewahr, daß es in dem Kasten war, den wir mit Erstaunen öffneten, aber mit noch größerem Erstaunen zu Boden warfen, da beim Öffnen des Kastens eine Feuerflamme herauskam. Es kam so manches Tier und damit so manche Feuerflamme heraus. Doch wir beruhigten uns, sammelten die Tiere wieder ein und waren sehr verwundert über ihren Glanz.“

way that does not restrict it to its representation, and does not identify the representation with the empirical object.

As a consequence, neither the simple inclusion of more relational actors, nor respect for the ecological communities of her research objects sets Merian apart from her contemporaries; especially, since her contemporaries at times also depict the different stages of the insects' transformation side by side and hence can be said to represent their interrelation as well – albeit neither as primarily nor as regularly and methodically as Merian, and without including their food plants. Nor is it a rejection of scientific procedures and classification, both of which she indeed incorporated to a certain degree in her work. (Wettengl 1998b, 1998a; Schmidt-Linsenhoff 1998) The remarkable distinction in Merian's work lies instead within the aesthetic complexion of her compositions. Through Merian's use of artistic mediation, the representational regime of the *Caterpillar-* and *Suriname-books* in fact widens to a complete transcendence of entomological strategies of representation. Her contemporaries rationalised their mediation to the visual dissection of the research objects, stripped their representations (both textual as well as pictorial) of any reference to subjectivity and focused on the insects' common features in order to establish categories that allow for nature's complete systematisation. Through emphasising this ideal, standardised, and from the particular, empirical abstracted version of the depicted animal that (quite intentionally) excludes all reference to the individuality and uniqueness of the depicted object, a universally valid image of the object is created. Thereby, the illustrations obtain a quality which separates the viewer from the object, places it at his or her disposal and turns the object into a lifeless thing without individual qualities. (Foucault 2002) The uniqueness of every empirical

specimen and both its nonidentity with any conceptual representation and indeed itself are not only unimportant, but covered up in these depictions. The object – falsely, as the contradictions within both Descartes’ and Reimarus’ work suggest – solidifies into an arbitrarily exchangeable thing, which is essentially indistinguishable from other representatives of its species. Through the representations of Merian’s contemporaries, the insects are perceived as identical across the representatives of their species.

Merian’s pictures, in contrast, inherit a very different quality. By relating the objects to one another and aesthetically creating a dynamic, processual expression, rather than embodying some kind of ecological dimension (which could at any rate only remain limited and questionable, considering their historical context) Merian’s depictions are of a quality that makes the objects of knowledge palpable as subjected to change and development. The specimens in Merian’s pictures have not reached a final stasis, as they do in representations that adhere to the exact ideal of Modern science. Although the research objects are fixated, they are affixed in their bodily integrity and in movement, appearing as objects in and for themselves – not as lifeless, purposeless agglomerates of matter. The insects surface not as definitive designations of the object’s essential, exhaustive being, but as exemplary approximations of the empirical objects, and as individuals that are nonidentical with other members of their species but also within themselves. In this way, Merian’s representations embrace both the uniqueness and distinctiveness of each physical object alongside its potentiality to change in the future, and thus do not restrict the animal to its mere physical presence, as Descartes and Reimarus try. Additionally, the images also reflect upon the difference between the object and our concept of it.



Merian, to a much greater extent than Reimarus, and indeed programmatically, does not abstract from the individual by reducing it to the commonality of its species or rejects the individuality of the empirical object, but inscribes a tension between the individual and the general into her images. Her objects say, to paraphrase Adorno: ‘I am a butterfly,’ not: we are the butterfly.<sup>45</sup> This tension, however, is not conceptually claimed and denominated, but expressed through the aesthetic construction of the images and, similarly, experienced aesthetically. The nonidentity of the objects is written into the depictions through their aesthetic structure and represented by and contained within the images themselves.

Furthermore, Merian’s representations actually appear to deny the viewer the opportunity to perceive the depicted objects as identical exemplars and thereby to subjugate them under his or her subjective perspective. If one were to isolate the blue butterfly in the lower corner of the *Suriname-book*’s Plate 7 from the composition, it just might pass as an archetypical exemplar that represents a whole identical population of its species – but within Merian’s composition, suspended, as Goethe might have added, between two beats of its wings, it transforms into an object in its own right, alike, but not to be confused with, any other member of its species (Figure 17, see Appendix). The individual in the plate’s upper corner is impossible to perceive as merely representing the shared features of its species. Any attempt instantaneously leads one back to its particularity. Thus, these images constantly remind the viewer of the limitations of identificatory forms of reason for capturing the object, as well as the limitations of the subject’s conceptual appropriation of the object. Such refusal, which resists the conclusive identification of the object as just

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<sup>45</sup> “Thus the rhinoceros, that mute animal, seems to say: ‘I am a rhinoceros.’” (Adorno 1997, 112)

another exemplar of its species on the one hand and makes evident the inadequacy of reason on the other, explains simultaneously some of the emotionally charged, hostile and condescending reactions to Merian's work from other scientists, especially in the past, as well as its contemporary allure.

### **Mediating the Lives of Animals through Aesthetic Comportment**

With her depictions of butterflies and moths, Merian thus mediates the gaping contradiction between the individuality and nonidentity of particular empirical animals and the general concept of the animal that pervades both Descartes' and Reimarus' works. She does so, however, not positively, that is, by completely identifying the animal or subsuming it under its concept, as Descartes and Reimarus attempted in their different ways; rather, she does so negatively, by re-inscribing into her depictions the limitation of the object's determination in the form of its individuality and particularity – those qualities lost in the name of conclusive identification and determination in the positivist study of animals. Paradoxically then, it is this subjective-aesthetic approach to mediating her research objects, a comportment the rejection of which precisely Modern science embodies, that actually proves more objective and capable of moving closer to her research objects than the acclaimed exact and objective positivist study of nature, I suggest.

Indeed, "the objectivity of value-free positivist knowledge as superior to supposedly merely subjective aesthetic singular standpoints"<sup>46</sup> is often presumed, according to Adorno (1997, 250, translation modified). Yet, he points out, "the form in

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<sup>46</sup> „Supponiert wird vielfach die Objektivität wertfrei positivistischer Erkenntnis oberhalb der vermeintlich bloß subjektiven ästhetischen Einzelstandpunkte.“

which something can be thought is not indifferent to what is thought”<sup>47</sup> (ibid., 111, translation modified). Of course, no zoologist claims today the identity between specimens the way Descartes and Reimarus still did. Instead, they are careful to stress that they register variance or diversity. However, remaining inside the ideal of (scientific) methodology and identificatory reason, positivist zoology cannot help it but to also restrict their empirical objects of knowledge to what they can express in (quantifiable) concepts. But identification reaches its limits at that what cannot be recognised in more than one object, that is empirical uniqueness, for example of an animal and its spontaneity in adjusting to changed conditions, which keeps its future behaviour and development fluid. Because the positivist study of nature remains trapped within its formal restriction of identifying commonalities of objects, it also remains incapable of thinking the empirical uniqueness of animals. Merian, in contrast, escapes this trap precisely by relying on a different formal approach to nature research. “Aesthetic expression,” explains Adorno,

is the objectification of the non-objective, and in fact in such a fashion that through its objectification it becomes a second non-objective: It becomes what speaks out of the artifact, not as an imitation of the subject. Yet it is precisely the objectivation of expression, which coincides with art, that requires the subject who makes it and – in bourgeois terms – makes use of his own mimetic impulses.<sup>48</sup> (Ibid., 111, translation modified)

Adorno, of course, refers to the production of authentic artworks in which the artist creates an object that realises a potential that is inherent to the (advanced) material

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<sup>47</sup> „... die Form, in der etwas gedacht werden kann, ist nicht indifferent gegen das Gedachte.“

<sup>48</sup> „Ästhetischer Ausdruck ist Vergegenständlichung des Ungegenständlichen, und zwar derart, daß es durch seine Vergegenständlichung zum zweiten Ungegenständlichen wird, zu dem, was aus dem Artefakt spricht, nicht als Imitation des Subjekts. Andererseits bedarf gerade die Objektivation des Ausdrucks, die mit Kunst koinzidiert, des Subjekts, das sie herstellt und seine eigenen mimetischen Regungen, bürgerlich gesprochen, verwertet.“

he or she works with by giving it a particular form and thereby helps the material to fulfil its potential in accordance with its own requirements, not the artist's. The quality of aesthetic expression to reveal what lies beyond the subject's conceptual grasp according to the immanent conditions of an object, however, can be applied to Merian's approach to the study of nature as well.

In complete opposition to Descartes and Modern science in general, who ostracise subjective and empathic experience and expression from cognition as foundation for knowledge, Merian relies heavily on subjective, aesthetic-artistic perspectives and approaches in her studies of the insect world. Rather than guiding and enclosing her experience through a strict and rigid method, as Descartes and Modern science in general advocate, her images and texts suggest that she studies her empirical subject-matter and presents her knowledge through the full reliance on her (subjective) sensibility as an artist and mediates the objects of knowledge accordingly. The aesthetic element proves to be at work in her cognitive process in two ways: through her artistic-aesthetic recognition of and sensibility for the beautiful, that is, the aesthetic qualities of the insects' forms and patterns and their exuberant vibrancy, Merian multi-sensorially perceives her research objects and in full consideration of subjective qualities; and in ways based on her subjective experiences and by means of her artistic-aesthetic training, she additionally mediates the insects into subjective, aestheticised representations in her books. Thus, Merian involves her artistic expertise far beyond the mere copying of empirical objects. Instead, she actively constructs the perception of the objects of knowledge through the subjective aesthetical processing of their representation. At the same time, her depictions nevertheless differ from primarily decorative images, as they rigorously

adhere to her empirical and experimental observations. Her representations neither randomly construct the objects at will, nor regard them solely according to an aesthetic value they bring to her compositions. In contrast to genuine artworks, which are self-referential and objects in their own right, Merian's images remain illustrations of something else and fully refer to an external object. They attempt adequately to mediate her research object: empirical nature itself.

Merian's metamorphosis pictures hence remain descriptive, but they move beyond mere technical artistic reproduction in their description. Relying on mimetic experiences of her research objects, she translates and constructs in her representations the empirical experience of the research objects through artistic-aesthetic means. Thus, Merian adds an aesthetic level to the empirical, experimental, and cognitive examination of the research objects. Consequently, her work shows the accomplished artist as well as the careful scholar of entomology. Through deploying her artistic training and perceptive capacity, Merian breaks up the distanced position of the apparently neutral, objective natural scientist. Aesthetically excogitating the objects, Merian thinks the objects through their aesthetic dimension and is thereby able to perceive the object beyond the modifying perception – mediated through identificatory reason – of the knowing subject. Instead of constricting her research objects to the conceptual recordable and turning them into identical specimens through measuring and quantifying them, she palpates them within scientifically-experimental and aesthetic constellations similar to Adorno's model of constellational knowledge in *Negative Dialectics* as introduced at the beginning of my study. Instead of breaking through the constraints of identificatory thinking by means of philosophical concepts, Merian's work does so through its artistic-aesthetic element.

While her images are not authentic artworks in Adorno's sense, they nonetheless partake in the epistemological qualities in respect to the subject-object relationship as Adorno evokes throughout *Aesthetic Theory* and as I sketched them earlier. As a consequence, the representations oscillate respectively between art and science, indulgence and examination, enchantment and disenchantment of the insects, the particular and the general, the empirical individual and the intellectual concept. Thereby, she forestalls the objects' devaluation into mere, exchangeable things as it is inherent to Modern science. Instead of subjugating the insects under the constraints of identificatory thinking, Merian's metamorphosis pictures assign priority to the object in the process of cognisance, as Adorno called for, by subordinating any conceptual framework to the full experience and particularity of the object. In conjunction, her images and texts thus mimetically approximate the empirical objects without, however, taking their place.

On the one hand then, Merian's work provides a model of cognition which by passing through the positivist study of nature moves beyond such a perspective and thereby achieves closer proximity to the objects of knowledge than the cognitive paradigm of Modern science. Merian's activity as an artist therein, which after all she exercised already at the end of the seventeenth century, validates the aesthetic discourse surrounding Kant and Hegel, and calls Reimarus' appropriation of the concept of art further into question; indeed he falls short not only of the discourse but of the actual state art had achieved in the eighteenth century. On the other hand, Merian's recourse to the aesthetic properties of animals also further undermines Reimarus' deterministic appropriation of the artistic behaviour and drives of animals – especially, when the question of an aesthetics of nature is extended to the conduct

of animals in respect to, for example, the choice of their reproductive partners in accordance to their aesthetic appearance, the complex compositions of songbirds or various forms of courtship displays. Instead of revealing the uniformity of animal behaviour, such aesthetics of nature seem to precisely point beyond any uniformity. As a consequence, matters of a zoological aesthetics, aesthetic preferences or – in Reimarus' terminology – art drives of animals require re-evaluation. Such questions that focus on particular qualities of animal behaviour and existence, however, extend beyond Merian's work, at least in the epistemological and natural-philosophical context of my study, and will have to be addressed elsewhere.

Indeed, it is not in any positive retort to particular qualities of animals and their behaviour or ecological communities, but rather in the very absence of any clear and definitive determination of the animal or in the representation of the animal as essentially nonidentical, that the full significance of Merian's work unfolds. Merian identifies through experimental-scientific procedures her research objects as members of a species – and in this capacity orders, sorts and even categorises them to a certain degree – but in her portrayals she moves beyond species commonalities to the insects' empirical individuality. Her representations thus move through the general and re-disperse it into the particularity of the empirical world again, as Horkheimer and Adorno explain the process of acquiring knowledge in their aphorism "Classification" (Horkheimer and Adorno 2002, 182). The specific form of Merian's depictions contains the dialectic between the general concept and the particular empirical manifestation as a tension within the image, which can be read out of her depictions. Instead of making the objects controllable through their visual and textual dissection, taming their empirical intractability against their complete

determination, by drawing from her empirical research and through the aesthetical requirements of the visual arts Merian creates illustrations of the insects that depict the objects as similar examples rather than identical archetypes, and thus not only leaves room in these depictions for the nonidentity of the actual, individual empirical specimens, but conspicuously inscribes particularity as such into the knowledge she depicts. She mediates the empirical experience of the research objects subjectively aesthetically into her pictures and recreates thereby the very quality of animals' empirical individuality, which both Descartes and Reimarus rejected but nevertheless could not evade, through and within the specific form and aesthetic expression of her images. Thereby she creates an experience of the animal that allows and indeed demands to think the objects as particular, historical manifestations of both their species and themselves, hence capturing and confronting the viewer through the animal with the nonidentity and particularity of the objective empirical world as such.



## Conclusion: Towards a Negative Zoology

Reflecting Adorno's epistemological expositions from *Negative Dialectics*, the preceding three studies explore the relationship between the Modern subject cognition and animals within three different constellations: the epistemological paradigm of Modern science through the development of Rene Descartes' philosophical body of work; the animal through the writings on ethology of Hermann Samuel Reimarus; and the aesthetical mediation of animals through the studies of insect metamorphoses by Maria Sibylla Merian.

This exploration aligns with the current challenge of renegotiating humanity's relationship to nature under the conditions of an experience of nature as entity both vulnerable in itself and a threat to society. Nature becomes manifest today as an entity at our mercy and hence without agency or autonomy, but simultaneously also as balking at our control, both physically and given the difficulties of reliably determining nature's functioning also intellectually, and hence as an autonomous entity. This experience reflects the limitation of the knowing subject's ability actually to comprehend the object of knowledge, as well as the knowing subject's dependency on the object of knowledge. From the perspective of Adorno's negative dialectical philosophy of nonidentity we fail to successfully remediate our ecological morass because such limitation and dependency remain repressed and unreflected upon. Dictated by thinking's condition of identification on the one hand and the evolving and narrowing of reason as tool to dominate nature on the other, the knowing subject instead hypostatizes its identity with the object and assumes its ability to comprehend the object fully, exhaustively and definitively. As a consequence, the domination of nature unconsciously reproduces through the object's ongoing

adjustment and curtailment to the perspective of the knowing subject, even when science comes to nature's rescue.

Against such appropriation, Adorno posits a reconciliation between subject and object by working through the historically simultaneously true and false dualistic separation of subject and object, human and nature, achieved by confronting the subject with its limitation in comprehending the object and the acknowledgement of the object's nonidentity. Thereby, the object's reduction to the subject's grasp of it is on the one hand revealed as sham, and on the other nature in turn unearthed as the subject's root and nonidentical condition, rather than its mere other. Under current historical conditions, animals would not only benefit from any such reconciliation, but also play a particularly central role within it.

Resolutely holding on to the conviction of the automatised functioning of animals despite his continuous inability to demonstrate it conclusively, Descartes displays the *diktat* of identificatory thinking, as does Reimarus in his conviction regarding the predetermination of animal behaviour despite the contradictoriness of his empirical examples. Furthermore, possibly no other work than Descartes' reflects more systematically and with more dedication and conviction the securing of the coherence of identification through stylisation of the knowing subject as the measure of all things and reification of the objects of knowledge through their methodological ascertainment. Quite contrary to Descartes' assurance however, an immanent critique of his writings reveals that the animal as object of knowledge proves particularly resistant to its determination and thus subordination to identificatory reason, as indicated in Adorno's (1978, 112–3) and Benjamin's (1996, 448) aphorisms "People are looking at you" and "Gloves." Instead, the absence of a clear determination draws

an image of the animal as “negation,” in which the animal figures as a field of tension conflicted and changing within itself. Such perception of the animal is substantiated by the immanent critique of Reimarus’ theory of a preconfigured animal psychology and behaviour. Rather than being able convincingly to show the spontaneous habits of animals as rigidly predetermined, Reimarus’ examples of spontaneous animal behaviour instead reveal the empirical animal to be mediated between its individual stirrings and experiences within specific situations, as well as the general conditions of its species. Hence the animal in Reimarus’ theories again emerges as being mediated within itself and within its environment, reflecting Adorno’s claim about the object’s mediatedness from *Negative Dialectics* (cf. Thyen 1989, 213–5). Merian’s insect studies finally cement this negative image of the animal by determining them simultaneously as members of their species and as particular manifestations different from the unifying correspondence of their commonalities. Within these various constellations, then, the animal as object of knowledge proves resistant to its conclusive and definitive comprehension, and emerges instead as nonidentical: by proving resistant against identification in the context of Descartes’ philosophy of nature and epistemology; through its behaviour in the context of Reimarus’ psychological ethology; and within Merian’s insect studies through the aesthetical mediation of her objects of knowledge.

As such then, the animal confirms the limits of knowledge within the mediatedness of the object and reveals in turn the delusion of the subject’s identity with the object of knowledge. In contrast to Descartes and Reimarus, Merian reflects and acknowledges this limitation by including the nonidentity and self-mediatedness of the object within her studies, and proves as a result much more reliable and apt in

grasping her objects of knowledge. Merian neither subordinates the object to her view and grasp, nor surrenders to her reliance on determining commonalities. Instead, the relationships between object and subject and particular specimens and general classifications are kept in tension within her representations, which simultaneously remain negative by abstaining from conclusively specifying her objects of knowledge. On the one hand, her aesthetic insect studies thus provide an avenue to the study of nature that promises to relieve nature of its adjustment to the partial perspective of the subject. Thereby, her approach promises a way out of our current dilemma in conceptualising and indeed approaching nature as either reliably manageable or beyond any generalising grasp. Tracing the dialectical tension between particular specimens and their general commonalities within nature, her approach undergirds nature against its societal appropriation. On the other hand, however, through the objects' aesthetic mediation Merian's images confront the viewer with the their nonidentity, and hence the limitation of the subject's control over the object.

At this point, Merian's approach to nature research converges with Adorno's social criticism, thereby manifesting the critical social relevance of Merian's work for curtailing anthropocentrism. Humans, Adorno (1997, 119) claims, recognise their repressed likeness with animals in the encounter with them. While within this moment the subject is also forced to remember its own rootedness in nature, humanity, at least in the West, rejects such memories by declaring its essential and radical difference from and superiority to animals through the assurance of animal behaviour as fully controlled and automatised, whether through their bodily construction, their drives and instincts, or their genes, on the one hand, and the

independency and freedom of the human spirit on the other. To enable reconciliation, the challenge is to turn the remembrance from evoking repression, as dictated both by thinking's necessary reliance on identification and the internalised tendency to dominate nature, into recognition [*Eingedenken*], thereby recovering in a conciliatorily way the dependency of the subject as well as the independency of the animal and nature. Recognition [*Eingedenken*] would entail the realisation of the subject's ligation, at least under current historical conditions, to identificatory thinking in conjunction with its limitations, along with the acceptance of the nonidentity of subject and object, as well as of the object with itself, and therefore protection of the objects' inexchangeability. In *Aesthetic Theory*, Adorno explicates that

if the case of natural beauty were pending, dignity would be found culpable for having raised the human animal above the animal. In the experience of nature, dignity [as human self-raising above the animal, AK] reveals itself as subjective usurpation that degrades what is not subordinate to the subject – qualities – to mere material and expulses it from art as a totally indeterminate potential.<sup>1</sup> (Adorno 1997, 62)

Adorno, of course, problematises the expulsion of natural beauty as a category from aesthetics and recovers it for a theory of art and the artwork, not the representation of natural objects and their beauty. Indeed,

only through their polar opposition, not through pseudomorphosis of art into nature, are nature and art mediated in each other. The more strictly artworks abstain from rank natural growth and the replication of nature, the more the successful ones approach nature. Aesthetic objectivity, the reflection of the

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<sup>1</sup> „Machte man einen Revisionsprozeß ums Naturschöne anhängig, er träfe Würde als die Selbsterhöhung des Tiers Mensch über die Tierheit. Sie enthüllt sich, im Angesicht der Erfahrung von Natur, als Usurpation des Subjekts, welche das diesem nicht Unterworfenen, die Qualitäten, zu bloßem Material degradiert und als ganz unbestimmtes Potential aus der Kunst wegräumt, wessen diese dem eigenen Begriff nach bedürfte. Nicht sind die Menschen mit Würde positiv ausgestattet, sondern sie wäre einzig, was sie noch nicht sind.“

being-in-itself of nature, realizes the subjective teleological element of unity; exclusively thereby do artworks become comparable to nature. (Ibid., 77)

From an artistic point of view, Merian's depictions obviously fall short of this and have nothing to do with art in the sense articulated by Adorno. But Adorno's reconsideration of natural beauty simultaneously retroacts on the status of nature as completely dependent and predetermined in opposition to human freedom as well.

Natural beauty vanished from aesthetics as a result of the burgeoning domination of the concept of freedom and human dignity, which was inaugurated by Kant and then rigorously transplanted into aesthetics by Schiller and Hegel; in accord with this concept nothing in the world is worthy of attention except that for which the autonomous subject has itself to thank. The truth of such freedom for the subject, however, is at the same time untruth: unfreedom for the other. (Ibid., 62)

Indeed, Merian's works do not receive their contemporary significance by being works of art. Instead, it is Merian's commitment to aesthetically mediating animals in particular that provides an experience of animals as nonidentical entities which at least allows for and possibly even promotes raising the memory of nature in the subject [*Eingedenken*], rather than provoking the degradation of the qualities of animals and suppression of the subject's roots in nature. Adorno (1997, 78) goes on to explain that "with human means art wants to realize the language of what is not human." Again, this happens only within the confines and the immanent conditions of the authentic artwork, not by representing an actual empirical object through an artwork. However, "the pure expression of artworks freed from every thing-like interference, even from everything so-called natural," nevertheless

converges with nature, just as in Webern's most authentic works the pure tone, to which they are reduced by the strength of subjective sensibility, reverses dialectically into a natural sound: that of an eloquent nature, certainly, its language, not the portrayal of a part of nature. The total subjective elaboration of art as a nonconceptual language is the only figure, at the contemporary stage of rationality, in which something like the language of the divine creation is reflected, qualified by the paradox that what is reflected

is blocked. Art attempts to imitate an expression that would not be interpolated human intention.<sup>2</sup> (Ibid.)

Thus, through the mediating effort of the artist-subject and reliance on the nonconceptual language of art, the artist is capable of creating an expression beyond his or her own intentions and therefore beyond the appropriation of the material.

Within the aesthetic experience of the beauty of nature, that is, in simplified terms, the ability of natural phenomena to overwhelm and enthrall, there surfaces “a reflex of bourgeois megalomania, a preoccupation with setting new records, quantification, and bourgeois hero worship” (Adorno 1997, 70). Yet at the same time, Adorno cautions, such a critical assessment “fails to perceive that natural grandeur reveals another aspect to its beholder: that aspect in which human domination has its limits and that calls to mind the powerlessness of human bustle” (ibid.). Although it is impossible and preposterous to define and fixate natural beauty conceptually, in the most rudimentary sense it can be detected “in the degree to which something not made by human beings is eloquent: in its expression” (ibid.). While such expression cannot be without a subject that proves receptive to it, at the same time “it is not reducible to the subject; natural beauty points to the primacy of the object in subjective experience” (ibid., 71). As a consequence, “natural beauty is the trace of the nonidentical in things under the spell of universal identity” (ibid., 73). The beauty of

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<sup>2</sup> „Kunst möchte mit menschlichen Mitteln das Sprechen des nicht Menschlichen realisieren. Der reine Ausdruck der Kunstwerke befreit vom dinghaft Störenden, auch dem sogenannten Naturstoff, konvergiert mit Natur, so wie in den authentischsten Gebilden Anton Weberns der reine Ton, auf den sie sich kraft subjektiver Sensibilität reduzieren, umschlägt in den Naturlaut; den einer beredten Natur freilich, ihre Sprache, nicht ins Abbild eines Stücks von ihr. Die subjektive Durchbildung der Kunst als einer nichtbegrifflichen Sprache ist im Stande von Rationalität die einzige Figur, in der etwas wie Sprache der Schöpfung widerscheint, mit der Paradoxie der Verstelltheit des Widerscheinenden. Kunst versucht, einen Ausdruck nachzuahmen, der nicht eingelegte menschliche Intention wäre.“

nature proves to be an other both vis-à-vis the ruling principles of identification and the spirit's mere adjustment to the useful, but also vis-à-vis the diffuse diversity of the empirical world. Instead, natural beauty resembles the reconciled. (Cf. *ibid.*, 74)

Even though Merian remains within the descriptive illustrative, by tracing and translating the beauty of the objects with her compositions, and thus exceeding their standardised representational replication by aesthetically mediating them, she hence subjectively mediates the animals' nonidentity, that is their quality of being mediated within themselves between their individual freedom and objective, material dependency. Rather than abstractly coinciding with nature in creating non-natural objects that speak for themselves and out of their own construction, then, Merian's depictions help the animal articulate itself as nonidentical through its aesthetic mediation. Artworks, now, "exercise a practical effect, if they do so at all, not by haranguing but by the scarcely apprehensible transformation of consciousness" (Adorno 1997, 243). They transform consciousness "by the affront to reigning needs, by the inherent tendency of art to cast different lights on the familiar," through which "artworks correspond to the objective need for a transformation of consciousness that could become a transformation of reality" (*ibid.*). Recapturing our likeness with animals in the encounter with them, Merian's particular way of mediating the animal in the exact same moment refuses to allow us to reject this likeness by undermining the dualism of mutually exclusive passive and dependent nature on the one side, and the human realm of freedom and independency on the other, with which humans have reacted to and rejected the memory of their animal likeness. Instead, "in its clownishness" – the mimetic approximation and remodelling of nature, as it is peculiar to the animal-like behaviour of clowns –



art consolingly recollects prehistory in the primordial world of animals. Apes in the zoo together perform what resembles clown routines. The collusion of children with clowns is a collusion with art, which adults drive out of them just as they drive out their collusion with animals. (Ibid., 119)

Being confronted with the animal in this way through Merian's mimetically approximating representations of insects, the subject is urged and invited to recognise its own origin within [*Eingedenken*], and dependency upon nature, despite all its freedom. While Merian's depictions hence do not "arrive concisely at concrete philosophising," (Adorno 1973a, xix, translation modified) her aesthetically empathic approach to zoology provides crampons and ice axes to negotiate a pathway through the "frozen waste of abstraction" (ibid.) towards recovering "the life peculiar to" animals (Horkheimer and Adorno 2002, 205). From here, it is up to philosophy to resume the humility Merian's work extends to animals by developing a negative zoology that retraces the contradictions within the history of positive zoology and reveals the nonidentical indeterminacy of animal lives, to fully redeem the reconciliatory potential of Merian's depictions.

## Appendix: Figures

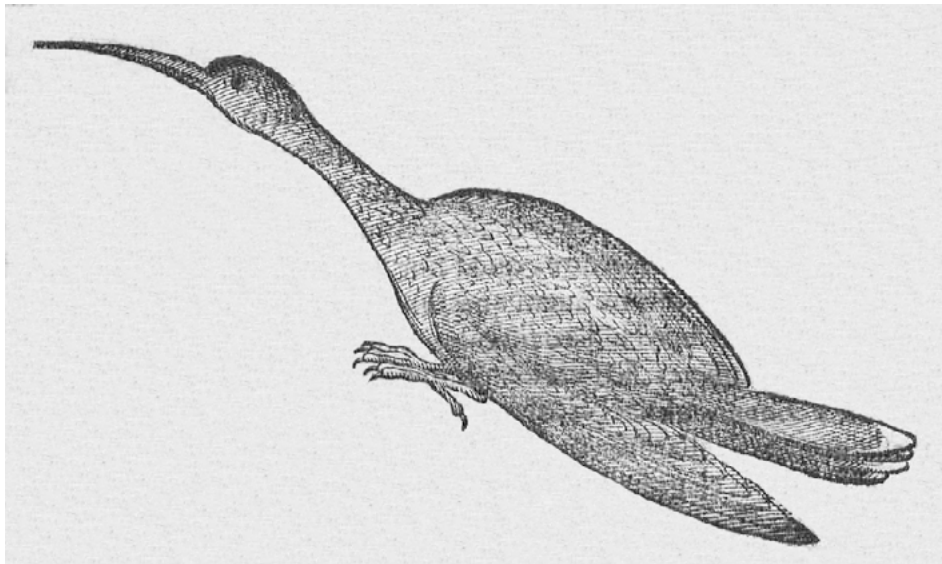


Figure 1.1  
Rembrandt, *Two Studies of a Bird of Paradise*, drawing, about 1637 (Rembrandt 2007, plt. 99)

Figure 1.2  
Johann Faber, *Hoitzitziltototl. Avis picta Americana, Animalia Mexicana*, print, 1628 (Faber 1628, 705)





Figure 2  
Maria Sibylla Merian, Guajava Tree with Spiders and Colibri, *Suriname-book*, coloured copper plate print, engraving by Jan Pieter Sluyter, 1705 (Merian 1705, unpaginated, plt. 18)





Figure 3  
Maria Sibylla Merian, Guajava Tree, *Suriname-book*, coloured copper plate print, engraving by Jan Pieter Sluyter, 1705 (Merian 1705, unpaginated, plt. 19)





Figure 4  
Maria Sibylla Merian, Grapefruit, *Suriname-book*, coloured copper plate print, engraving by Joseph Mulder, 1705  
(Merian 1705, unpaginated, plt. 29)





Figure 5  
Maria Sibylla Merian, Morning Glory with White Yam, *Suriname-book*, coloured copper plate print, engraving by Joseph Mulder, 1705 (Merian 1705, unpaginated, plt. 50)

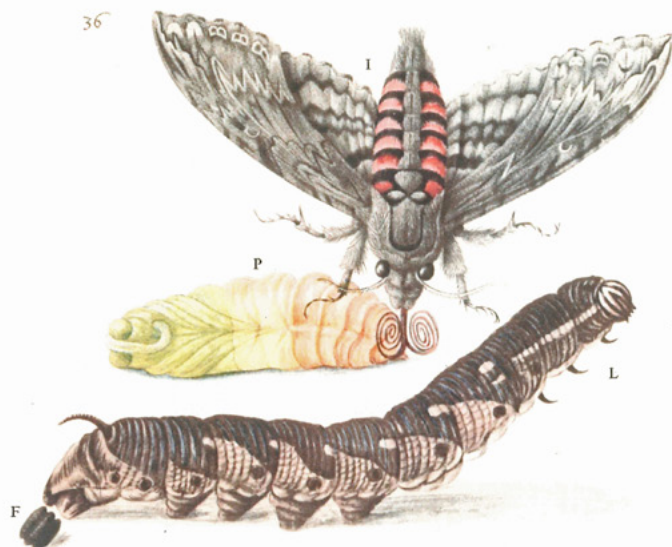


Figure 6  
Maria Sibylla Merian, Large Blue Lily, *Flower-book*, coloured copper plate print, 1675 (Merian 1981, unpaginated, pt. 1, plt. 8, )

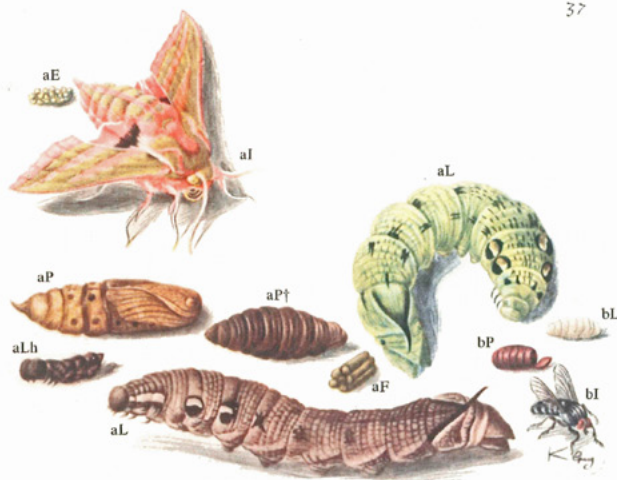




Figure 7  
Maria Sibylla Merian, White Dogtooth, Red Hyacinth, Persian Iris and May Lilly or Grape Hyacinth, *Flower-book*, coloured copper plate print, 1680 (Merian 1981, unpaginated, pt. 3, plt. 4)

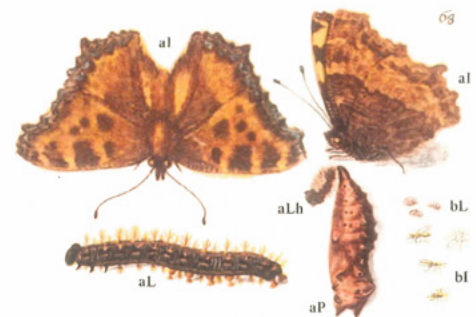


36 Lep. Sphingidae: *Agrius convolvuli* (L., 1758) – L, P, I



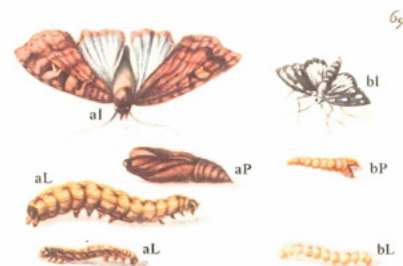
37 a Lep. Sphingidae: *Deilephila elpenor* (L., 1758) – L(2×), P(2×, 1×†), I, E

b Dipt. Tachinidae: Par ex 37a – L, P, I



68 a Lep. Nymphalidae: *Nymphalis polychloros* (L., 1758) – L, P, I(2×)

b Hym. Chalcidoidea: Par ex 68a – L(3×), I(4×)



69 a Lep. Noctuidae: *Xestia triangulum* (Hufnagel, 1766) – L(2×), P, I

b Lep. Pyraustidae – L, P, I



70 Lep. Noctuidae: *Polymixis flavicincta* (Denis & Schiffermüller, 1775) – L, P, I

Figure 8.1  
Maria Sibylla Merian, Sheets 36 and 37, *Study-book*, watercolour on vellum, end of 17th century (Merian 2011, 169|15)

Figure 8.2  
Maria Sibylla Meria, Sheets 68, 69 and 70, *Study-book*, watercolour on vellum, end of 17th century (Merian 2011, 193|27)

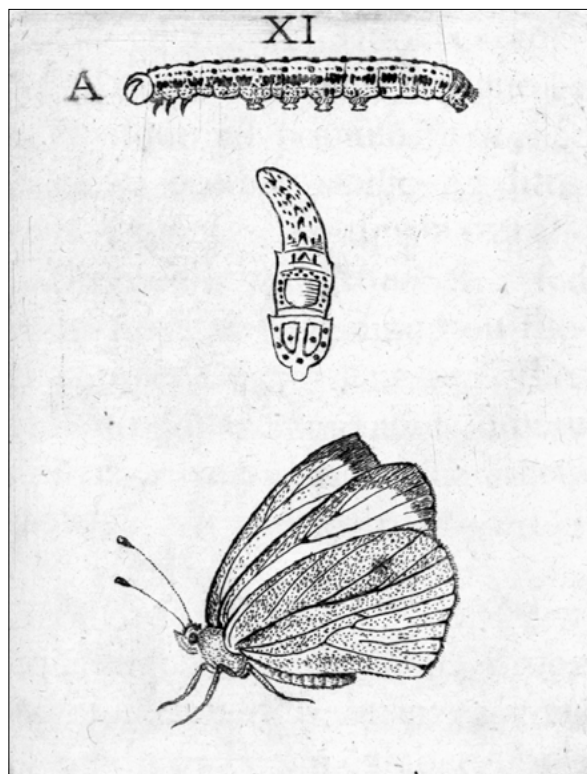
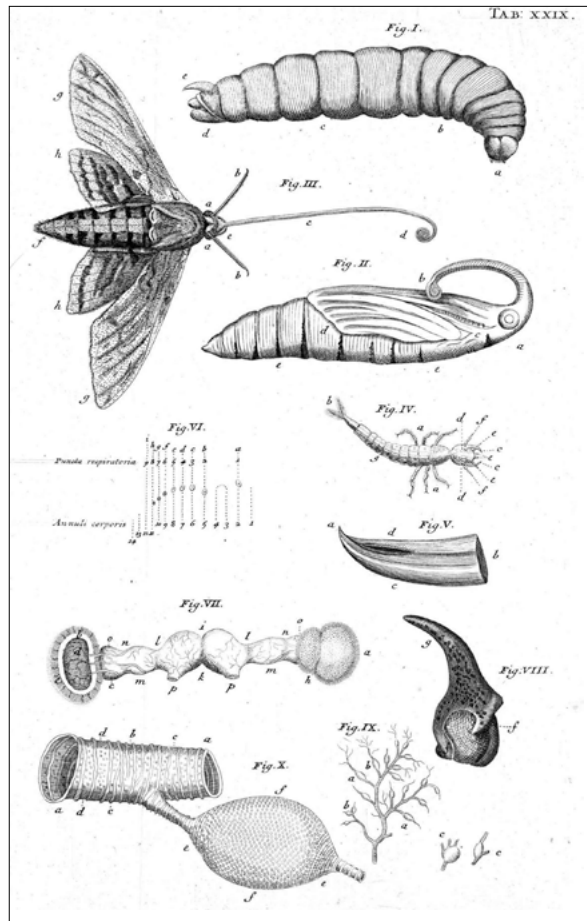
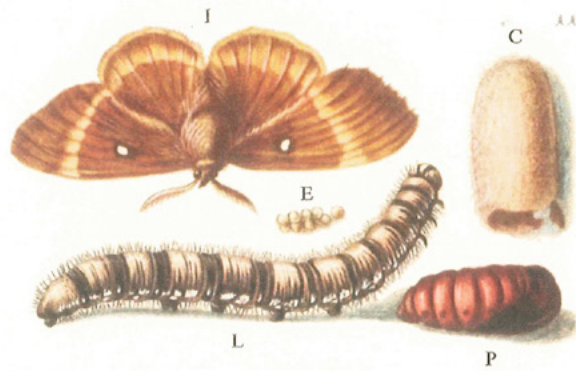
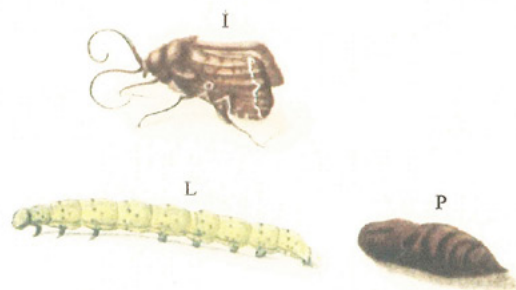


Figure 9.1  
Johannes Goedaert, Plate XI, *Metamorphosis et historia naturalis insectorum*, copper plate print, 1662  
(Goedaert 1662, unpaginated, plt. 11)

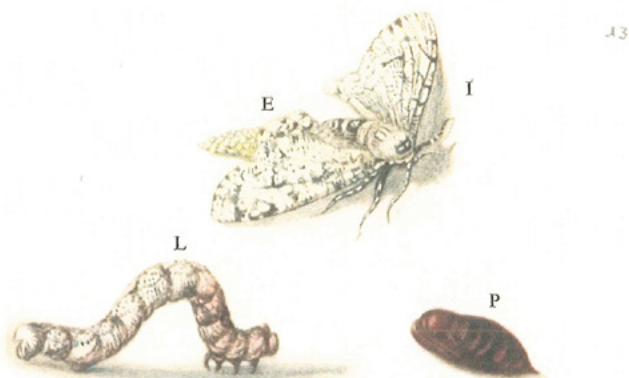
Figure 9.2  
Jan Swammerdam, Plate XXIX, *Historia Insectorum Generalis*, copper plate print, 1669 (Swammerdam 1738,  
unpaginated, plt. 29)



11 Lep. Lasiocampidae:  
*Lasiocampa quercus* (L., 1758) –  
 L, P, C, I, E



12 Lep. Noctuidae: *Lacanobia*  
*oleracea* (L., 1758) – L, P, I



13 Lep. Geometridae: *Biston*  
*betularia* (L., 1758) – L, P, I, E\*

Figure 10  
 Maria Sibylla Merian, Sheets 11, 12 and 13, *Study-book*, watercolour on vellum, end of 17th century (Merian 2011, 151|6)





Figure 11  
Maria Sibylla Merian, White Filled Sour Cherry Blossom, *Caterpillar-book 1*, copper plate print, 1679 (Merian 1679, unpaginated, plt. 9)





Figure 12  
Maria Sibylla Merian, Green Cabbage, *Caterpillar-book 2*, copper plate print, 1683 (Merian 1683, unpaginated, plt. 39)





Figure 13  
Maria Sibylla Merian, Yellow Collard Flower, *Caterpillar-book 1*, copper plate print, 1679 (Merian 1679, unpaginated, plt. 45)





Figure 14  
Maria Sibylla Merian, Ripe Pineapple with Cochineal, *Suriname-book*, coloured copper plate print, engraved by Jan Pieter Sluyter, 1705 (Merian 1705, unpaginated, plt. 2)





Figure 15  
Maria Sibylla Merian, Large White Bindweed, *Caterpillar-book 2*, copper plate print, 1683 (Merian 1683, unpaginated, plt. 45)





Figure 16  
Maria Sibylla Merian, Pomegranate, *Suriname-book*, coloured copper plate print, engraving by Joseph Mulder, 1705 (Merian 1705, unpaginated, plt. 9)





Figure 17  
Maria Sibylla Merian, American Cherry, *Suriname-book*, coloured copper plate print, engraving by Jan Pieter Sluyster, 1705 (Merian 1705, unpaginated, plt. 7)





Figure 18  
Maria Sibylla Merian, Fig Tree, *Suriname-book*, coloured copper plate print, engraving by Jan Pieter Sluyter, 1705  
(Merian 1705, unpaginated, plt. 33)





Figure 19.1-4  
 Maria Sibylla Merian, *Lapwing*, *Muscovy Duck*, *Squirrel Monkey*, *Wattled Jacana* (top left clockwise), British Museum, watercolour and bodycolour on vellum, circa 1701-05 ([www.britishmuseum.org](http://www.britishmuseum.org), item nos.: SL,5275.87, SL,5275.78, SL,5275.84 and SL,5275.90, accessed 18 December 2014)





Figure 20  
Maria Sibylla Merian, Blue or Garden Lillies, *Caterpillar-book 1*, copper plate print, 1679 (Merian 1679, unpaginated, plt. 35)





Figure 21  
Maria Sibylla Merian, Grapevine Blossom, *Caterpillar-book 2*, copper plate print, 1683 (Merian 1683, unpaginated, plt. 23)





Figure 22  
Maria Sibylla Merian, Medlar-Tree, *Suriname-book*, coloured copper plate print, engraving by Jan Pieter Sluyter, 1705 (Merian 1705, unpaginated, plt. 53)





Figure 23  
Maria Sibylla Merian, American Indian Jasmine, *Suriname-book*, coloured copper plate print, engraving by Jan Pieter Sluyter, 1705 (Merian 1705, unpaginated, plt. 8)





Figure 24  
Maria Sibylla Merian, Maccai, *Suriname-book*, coloured copper plate print, engraving by Joseph Mulder, 1705  
(Merian 1705, unpaginated, plt. 6)

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